KANSAS EVAPOTRANSPIRATION LABORATORY

ESTIMATED WINTER WHEAT YIELD FROM CROP GROWTH PREDICTED BY LANDSAT

Final Report: Contract NAS9-14899

For Period March, 1976 to March, 1977

May, 1977

RESEARCH FOR EFFICIENT WATER USE

Kansas State University

Manhattan

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16. Abstract This report describes an evapotranspiration (ET) and growth model for winter wheat. The inputs are daily solar radiation, maximum temperature, minimum temperature, precipitation/irrigation and leaf area index (LAI). The meteorological data are obtained from National Weather Service while LAI is obtained from Landsat multispectral scanner (MSS). The output provides daily estimates of potential evapotranspiration, transpiration, evaporation, soil moisture (50 cm depth), percentage depletion, net photosynthesis and dry matter production. Winter wheat yields are correlated with transpiration and dry matter accumulation.

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PREFACE

The objective of this study is to (1) develop an evapotranspiration (ET) model for winter wheat; (2) develop a relationship between Landsat data and leaf area index; (3) develop a growth model for winter wheat; and (4) develop a yield model using ET and growth models.

Field data were gathered from commercial fields and plots in Riley, Ellsworth, Finney and Thomas counties in Kansas. Data included leaf area index, soil moisture, growth stage, and yield.

Evapotranspiration and growth models required inputs of solar radiation, maximum temperature, minimum temperature, precipitation, and leaf area index. Meteorological data were obtained from National Weather Service. Leaf area indices were obtained from Landsat computer compatible tapes. Yields were estimated from the ET model; however, further testing and evaluation of the yield model are required.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 Introduction

This report summarizes the work completed under NASA Contract NAS9-14899. The first part of the report consolidates the evapotranspiration and growth models while the second section is divided into four appendices. Each appendix is independent and constitutes a detailed report on a particular aspect of the overall study.

We would like to acknowledge Dr. Arlin Feyerherm for estimating winter wheat yields with his yield model (Chapter 4.0).

2.0 Evapotranspiration (ET) Model

2.1 Model Development

The daily inputs into the model are solar radiation, maximum-minimum temperature, precipitation and leaf area index (LAI). Fig. 1 schematically shows the inputs. Potentially, meteorological satellites may be used to estimate solar radiation, temperature, and precipitation in areas where weather data are not available. Landsat data can be used to estimate LAI.

The evapotranspiration model described by Kanemasu et al. (1976) requires both soil and crop factors to estimate maximum evapotranspiration (ET_{max}) and transpiration. ET_{max}--the energy-limited ET occurring from a well-watered surface under nonadvective conditions--is given by Priestley and Taylor (1972) as

$$ET_{max} = \alpha[s/(s + \gamma)]R_n \qquad [2.1]$$

where α is a constant for a particular crop and climatic situation; γ is the psychrometer constant (mb/°K); s is the slope of the saturation vapor pressure curve (mb/°K) at mean temperature; and R_n is the 24-hr net radiation (mm/day). We evaluated α from lysimetric observations during periods of full canopy cover and wet soil surface ($\alpha = 1.35$). When R_n was not measured, we estimated it from solar radiation, R_s (mm day^{-1}), using

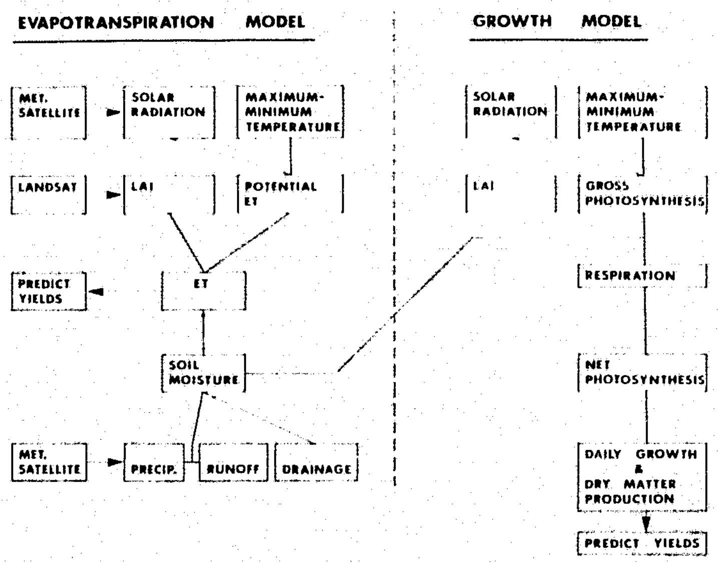


Fig. 1. Flow diagram of evapotranspiration (ET) and growth models. Potential use of meteorological satellites are shown. Winter wheat yields are predicted from ET and dry matter production estimates.

the regression equations:

$$R_n = .959\ R_s - 3.61 \qquad [2.2]$$

and

$$R_n = .926\ R_s - 2.70 \qquad [2.3]$$

where [2.2] was developed for growth stages up to jointing and for the remainder of the season [2.3].

Evaporation from the soil surface is limited by energy supplied during the constant rate stage; therefore, an energy transmittance term (τ), based on leaf area index, is required. The daily evaporation rate during the constant rate stage can be estimated by

$$E_o = (\tau/\alpha)ET_{max} \qquad [2.4]$$

where $\tau = \exp(-.737\ LAI)$. Equation [2.4]was used until $\Sigma E_o = U$. Then the evaporation was calculated according to the falling rate phase equation

$$E_f = ct^{1/2} - c(t-1)^{1/2} \qquad [2.5]$$

where c(mm $day^{-1/2}$) depends upon the hydraulic properties of the soil and t is days after stage 1 evaporation. The soil factors U and c were obtained from lysimetric observations on bare soil or from weight changes from large soil-filled containers.

Transpiration was estimated by equations of the form given by Tanner and Jury (1976) and Kanemasu et al. (1976). When the available moisture content in the root zone was greater than 35% of field capacity, we used

$$T = \alpha_v(1-\tau)[s/(s + \gamma)]R_n \qquad \text{crop cover} < 50\% \qquad [2.6]$$

and

$$T = (\alpha-\tau)[s/(s +\gamma)]R_n \qquad \text{crop cover} > 50\% \qquad [2.7]$$

where $\alpha_v = 1.56$.

When the available soil moisture (θ_a) was less than 35% of the maximum available moisture (θ_{max}), equations [2.6] and [2.7] were multiplied by K_s, given by

$$K_s = \theta_a/.35(\theta_{max}) \qquad [2.8]$$

Therefore, at θ_a less than .35 θ_{max} transpiration was linearly reduced as the available water decreased (Fig. 2). The maximum available water content of a soil should be determined in the field.

Soil moisture in the root zone (0-150 cm) was estimated from a water balance of evapotranspiration, precipitation, runoff, and drainage. Runoff was estimated according to the amount of rainfall (R) and moisture content in the surface 30 cm:

$$\text{Runoff} = 0 \qquad R < 2.5 \text{ cm} \qquad [2.9a]$$

$$\text{Runoff} = R^{.75} \qquad R > 2.5 \text{ cm} \qquad [2.9b]$$

where R is the rainfall in inches. The surface 30 cm was allowed to hold 15 cm of water. Therefore, the rainfall could fill the 30 cm layer to 50% by volume, then the remaining rain must be runoff. The soil profile was divided into 5 layers (5, 25, 30, 30, and 60 cm) and each layer was allowed to hold 50% water for two days before draining to field capacity (obtained from field measurements). The amount of water drained from the 5th layer (below 150 cm) was identified as drainage.

2.2 Procedure

The evapotranspiration (ET) model was tested on several fields over a two year period at Manhattan, Kansas. Daily estimates by the model were compared with lysimetric observations. Leaf area index (LAI) was measured by optical planimeter and/or leaf length and width calculations. Soil

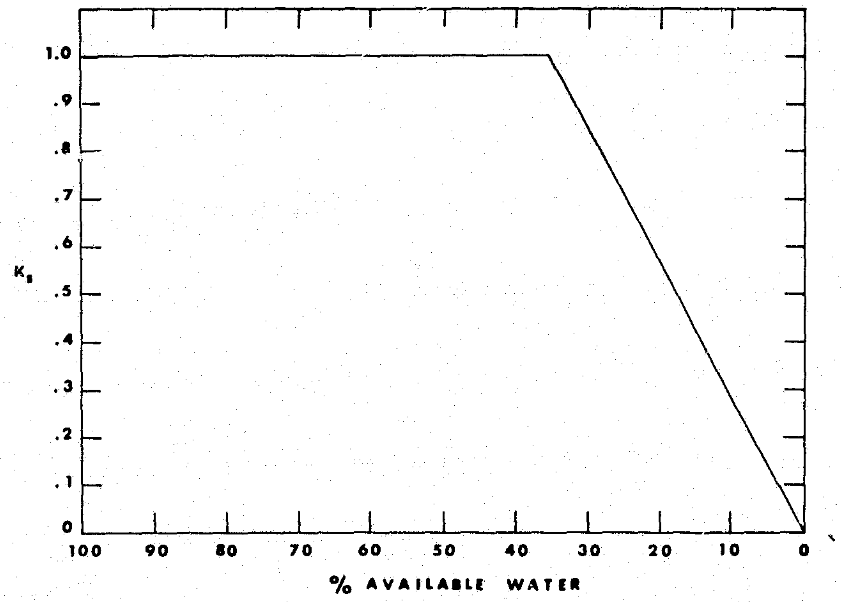


Fig. 2. Water stress factor (Ks) as a function of available water in the root zone. Ks linearly declines at 35% available water.

moisture estimates by the model compared favorably with neutron attenuation and gravimetric estimates (Appendix A).

LAI obtained from ground measurements are extremely tedious. Landsat data were used in the ET model by estimating LAI. Multiple regression equation was developed from Landsat coverage of Kansas sites (Colby, Ellsworth and Manhattan, Table I). Shown in Fig. 3 is the comparison of Landsat-predicted LAI with observed LAI. Figs. 4 and 5 show the season trends in observed and Landsat-predicted LAI. When Landsat predicted LAI curves were used in the ET model instead of observed LAI, seasonal ET estimates by Landsat were usually within 3.0 cm of the ET estimates from observed LAI measurements (Appendix A).

3.0 Soil Moisture Estimates from ET Model

For the 1975-76 winter wheat growing season, we obtained sample statistics for 22 sample segments in five Great Plains states (Kansas, Texas, Oklahoma, Nebraska, and Colorado). Analyst interpreters selected several wheat fields in each segment (4 to 20 fields). Landsat data were analyzed for each useable overpass date on all fields. For each date, leaf area index was estimted for each field and then averaged to obtain an average LAI for the segment (Figs. 6 and 7). The ET model was run on each segment and estimates of soil water depletion (higher percent depletions are drier) throughout the growing season are predicted (Figs. 8, 9, 10). Further details are given in Appendix B.

4.0 Yield Estimates from ET Model

A yield model was developed from small plot yields and the output from the ET model.

$$\text{Yield(metric tons/ha)} = 0.192[\Sigma(T/ET_{max})]_1^{0.172} \cdot [\Sigma(T/ET_{max})]_2^{0.104} \cdot [\Sigma(T/ET_{max})]_3^{0.646} \qquad [4.1]$$

Table 1. Computer compatible tapes from Landsat multispectral scanner used in data analysis.

TAPES USED IN DATA ANALYSIS

AREA	DATE	TAPE I.D. #
Colby	8/20/75	5123-16310
	8/29/75	2219-16442
	9/07/75	5141-16300
	9/25/75	5159-16285
	10/22/75	2273-16440
	1/11/76	5267-16221
	2/25/76	2399-16421
	4/01/76	2435-16410
	4/10/76	5357-16161
	6/02/76	5410-16065
	6/03/76	5411-16123
	6/12/76	2507-16391
	6/20/76	5428-16053
	6/30/76	2525-16384
	7/09/76	5447-16095
	9/10/76	2597-16364
	10/16/76	2633-16353
	11/21/76	2669-16341

AREA	DATE	TAPE I.D. #
Ellsworth	9/23/75	5157-16173
	10/02/75	2253-16324
	10/11/75	5175-16163
	10/20/75	2271-16323
	10/29/75	5193-16152
	11/07/75	2289-16322
	11/16/75	5211-16141
	1/18/76	2361-16313
	3/12/76	2415-16301
	3/21/76	5337-16061
	3/30/76	2433-16294
	6/01/76	5409-16011
	6/10/76	2505-16274
	7/07/76	5445-15583
	10/14/76	2631-16240
	11/01/76	2649-16233
	11/19/76	2667-16224
	12/25/76	2703-16211

AREA	DATE	TAPE I.D. #
Manhattan	10/20/73	1454-16374
	3/31/74	1616-16344
	4/18/74	1634-16341
	5/24/74	1670-16331
	6/29/74	1706-16320
	7/17/74	1724-16313
	8/04/74	1742-16305
	9/09/74	1778-16293
	10/15/74	1814-16283
	11/20/74	1850-16272
	12/07/74	1867-16205
	3/25/75	1975-16161
	4/12/75	1993-16152
	4/30/75	5011-16142
	5/18/75	5029-16133
	6/06/75	5048-16181
	6/24/75	5066-16171
	8/16/75	5119-16082
	11/15/75	5210-16083
	12/03/75	5228-16073
	4/16/76	2540-16232
	5/04/76	2468-16225
	6/09/76	2504-16220
	6/17/76	5425-15483
	7/06/76	5444-15525
	9/06/76	2593-16135
	9/24/76	2611-16131
	10/12/76	2629-16124
	10/13/76	2630-16182

AREA	DATE	TAPE I.D. #
Manhattan	10/31/76	2648-16174
	11/17/76	2665-16112
	11/18/76	2666-16170
	12/24/76	2702-16153

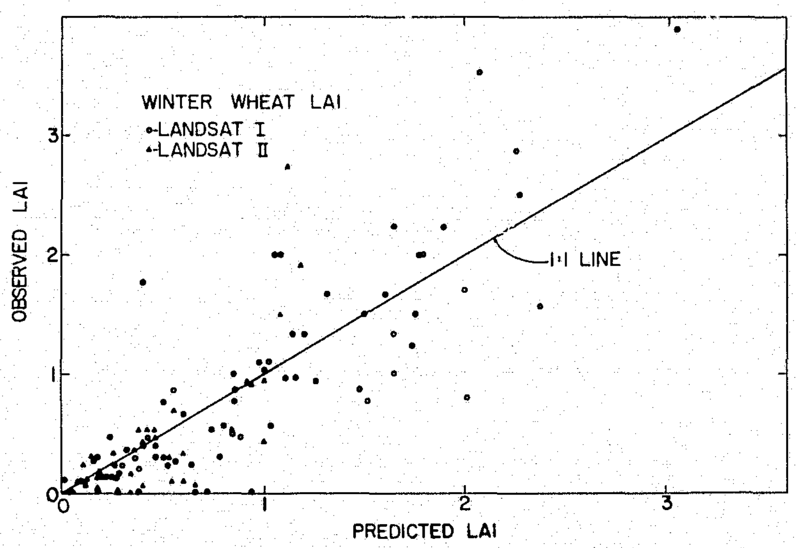


Fig. 3. Comparison of observed leaf area index (LAI) with Landsat-predicted LAI.

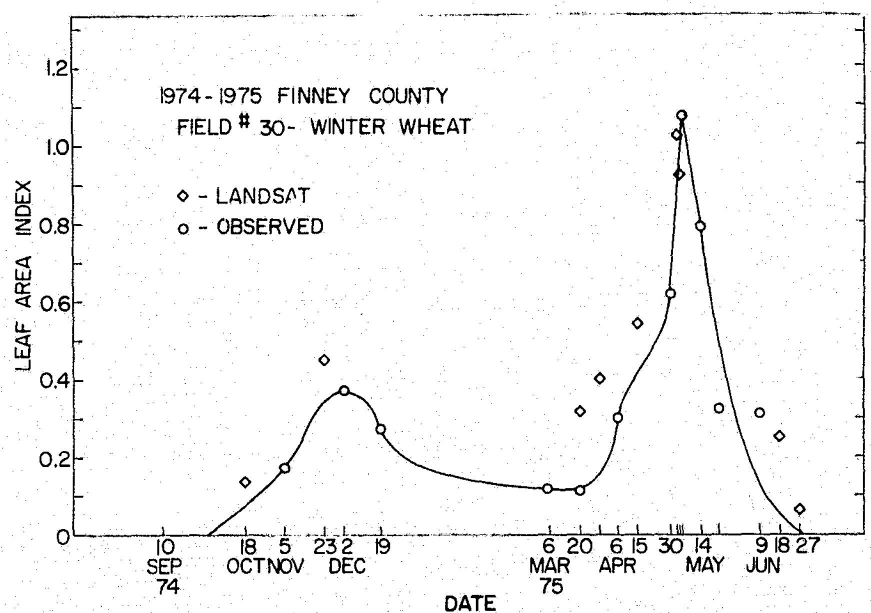


Fig. 4. Seasonal trends in observed leaf area index (LAI) in Finney County (solid line); square symbols indicate Landsat-predicted LAI.

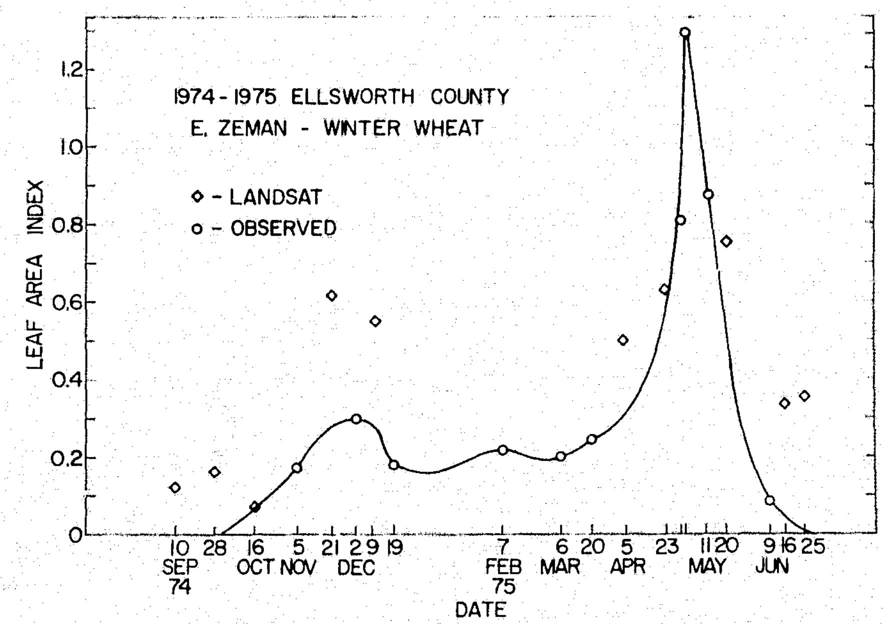


Fig. 5. Seasonal trends in observed leaf area index (LAI) in Ellsworth County (solid line); square symbols indicate Landsat-predicted LAI.

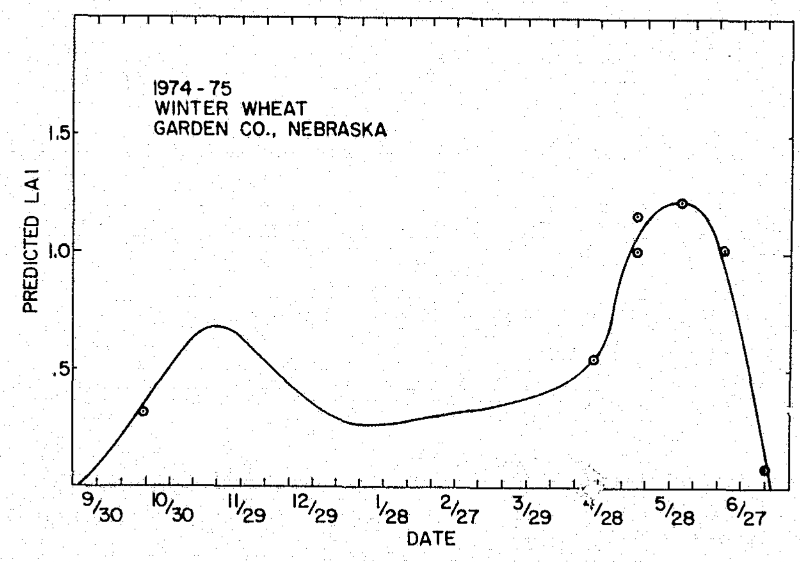


Fig. 6. Seasonal trends in Landsat-predicted leaf area index (LAI) for sample segment in Garden County, Nebraska, 1974-1975.

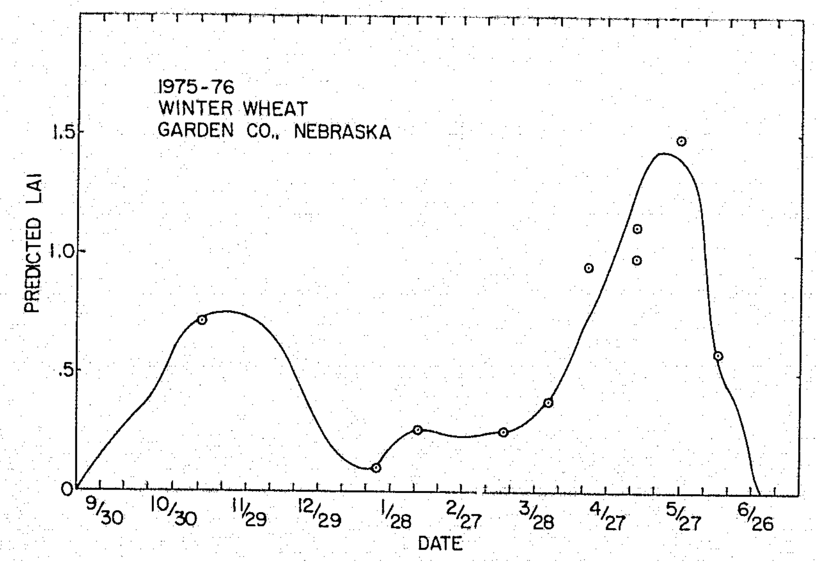


Fig. 7. Seasonal trends in Landsat-predicted leaf area index (LAI) for sample segment in Garden County, Nebraska, 1975-1976.

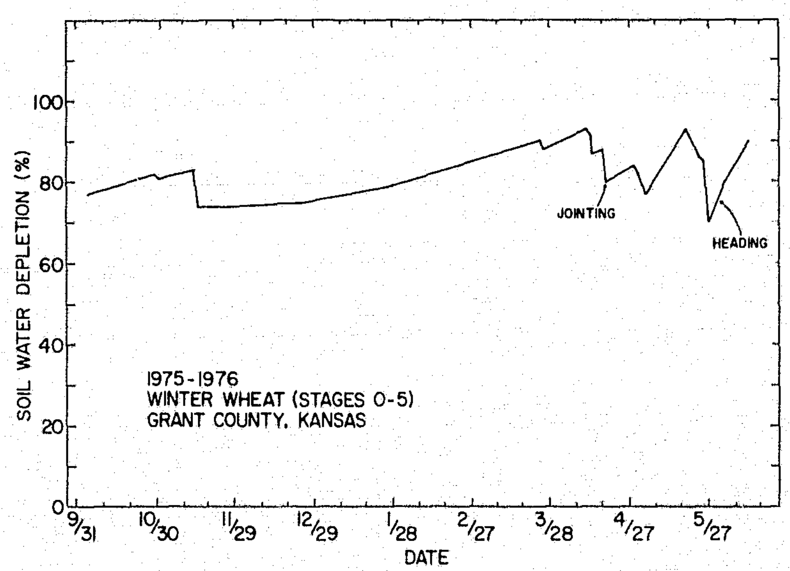


Fig. 8. Seasonal trends in soil water depletion in Grand County, Kansas, 1975-1976.

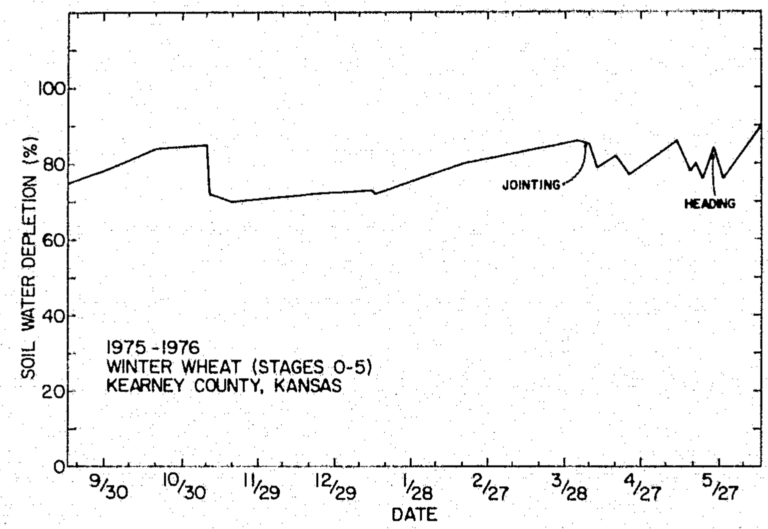


Fig. 9. Seasonal trends in soil water depletion in Kearney County, Kansas, 1975-1976.

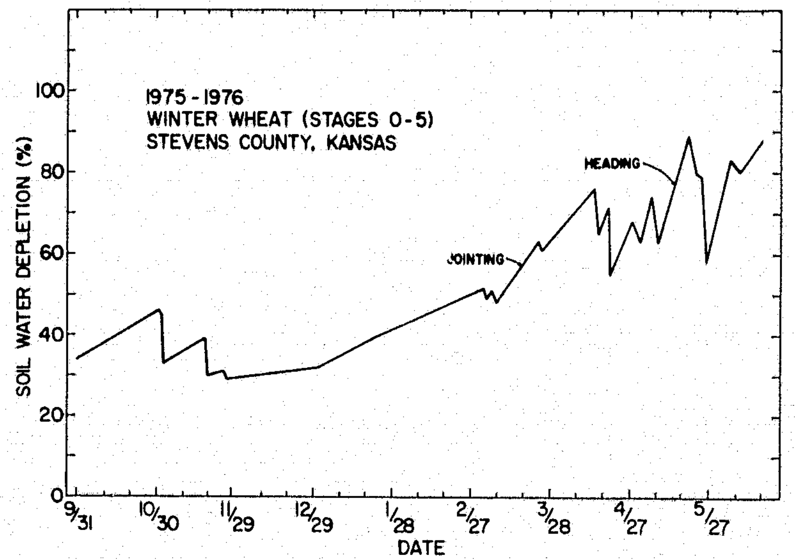


Fig. 10. Seasonal trends in soil water depletion in Stevens County, Kansas, 1975-1976.

where the subscripts 1, 2, and 3 are the respective growth stage intervals: emergence to jointing, jointing to heading, and heading to soft dough; T is the daily transpiration rate; ET_{max} is the energy-limiting evapotranspiration rate. Therefore, the yield model can be used on any field where the ET model can be applied.

Eleven wheat fields at Bushland, Texas presented an independent data set. Landsat and yield data were available (personnal communication with Dr. Clif Harlan, Texas A & M). The ET model was run using meteorological data and Landsat-predicted LAI. Yields were predicted from [4.1] and compared with observed yields (Fig. 11).

The soil moisture study over the 5 Great Plains states offered another data set; however,yields for individual fields were not measured. County yields were available from the Statistical Reporting Service (SRS). In addition, Feyerherm's KSU winter wheat model was run on the same data assuming a management and productivity (MAP) factor of 1 and summer fallow conditions. The root mean square error (RMSE) between the county yield and the ET yield model (eq. [4.1]) was 2.0 bu/acre while the RMSE between Feyerherm's yield model and the ET yield model was 1.5 bu/acre. Figs. 12, 13, and 14 show the comparison between the various yield estimates.

5.0 Growth Model

As shown in Fig. 1, the growth model uses the identical inputs as the ET model -- solar radiation, max-min temperature, precipitation, and LAI. The major assumption in the growth model is that light and soil moisture are the primary limiting factors in plant growth. Other factors such as fertility, pest and disease influence growth and are reflected in the LAI term.

Photosynthesis is estimated from the amount of light that the canopy intercepts which is dependent upon the solar radiation and LAI. Soil

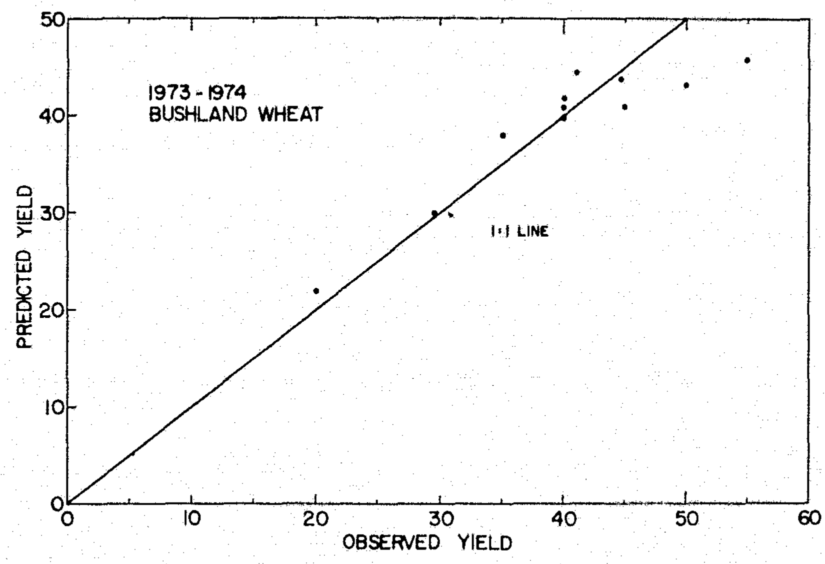


Fig. 11. Comparison between observed yields and predicted yield from evapotranspiration-yield model (r^2 = .9).

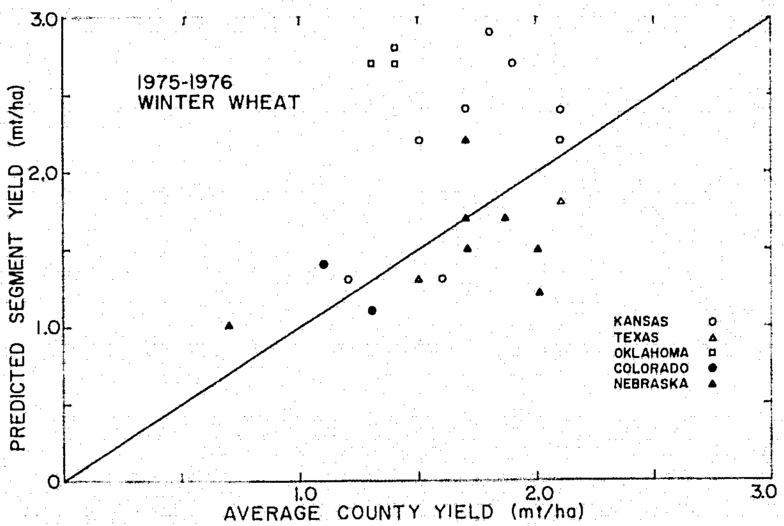


Fig. 12. Comparison between yields estimated by evapotranspiration-yield model and county yields.

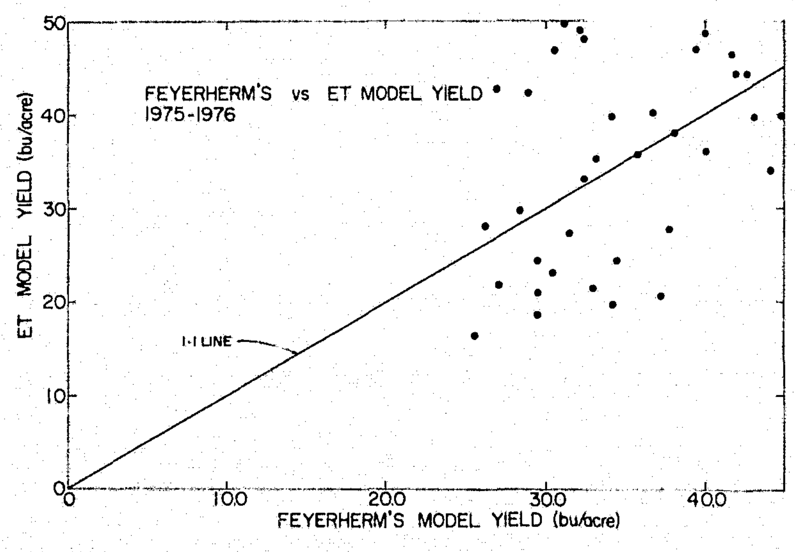


Fig. 13. Compairson between yields estimated by evapotranspiration-yield model and Feyerherm's yield model. Management and productivity factor (MAP) set equal to one.

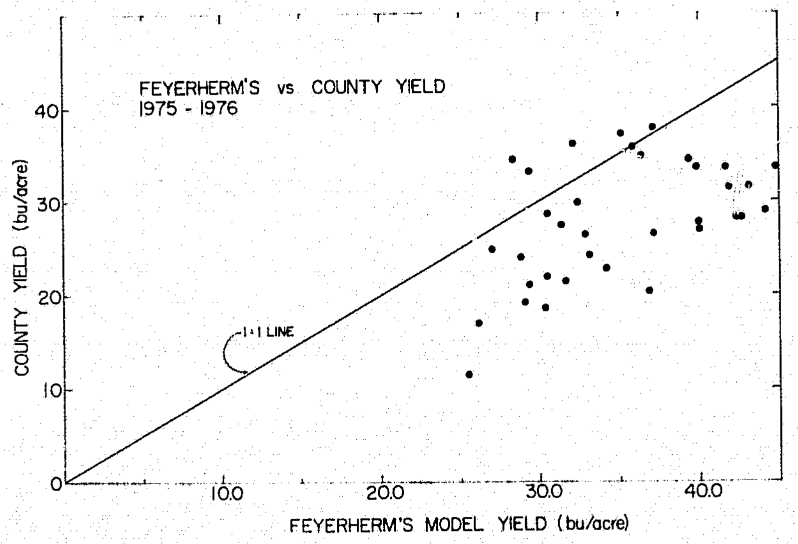


Fig. 14. Compairson between county yields and Feyerherm's yield model. Management and productivity factor (MAP) set equal to one and summer fallow conditions are assumed.

moisture decreases photosynthesis during high water depletion periods. Respiration is dependent upon LAI and temperature. The difference between photosynthesis and respiration is net photosynthesis which is the rate of dry matter production (Appendix C). The growth model simulated dry matter production on commercial fields in western, central and eastern Kansas using measured LAI. Fig. 15 shows the agreement in dry matter production estimated by the growth model using Landsat-predicted LAI and observed LAI.

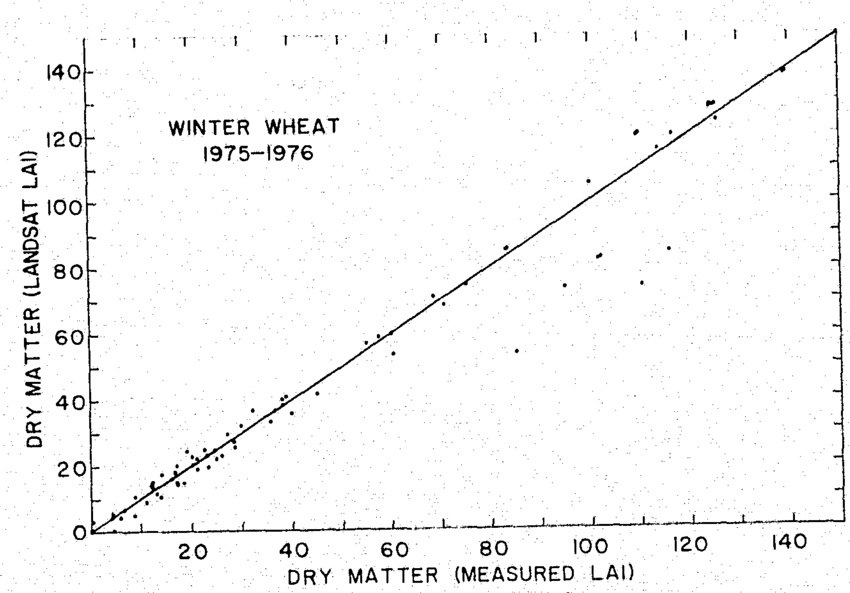


Fig. 15. Comparison of dry matter estimated by the growth model using measured leaf area index (LAI) and Landsat-predicted LAI.

APPENDIX A

USING LANDSAT DATA TO ESTIMATE EVAPOTRANSPIRATION OF WINTER WHEAT

USING LANDSAT DATA TO ESTIMATE EVAPOTRANSPIRATION OF WINTER WHEAT

ABSTRACT

An evapotranspiration (ET) model that accurately estimates daily water use and soil moisture on a regional basis is required for many agricultural and hydrological studies. The model should use meteorological data that are readily available and crop information that is responsive to the changing vigor of the plants.

We evaluated an ET model with a weighing lysimeter and then applied it to winter wheat fields at four Kansas locations. Model inputs are solar radiation, temperature, precipitation, and leaf area index (LAI); included in the outputs are estimates of transpiration, evaporation, and soil moisture. An equation was developed to estimate LAI from Landsat data. Because LAI can be estimated from satellites, the ET model potentially can be used on a regional basis.

INTRODUCTION

An important factor influencing wheat growth and grain yield is soil water availability. Daily or short-term evapotranspiration (ET) rates are desirable to predict grain production (Jensen, 1968). Several ET models have been proposed (Jensen, 1973; Baier and Robertson, 1966; Richie, 1972; Tanner and Jury, 1976); they possess various degrees of complexity as to input data. When applied on a regional basis, many models are not acceptable because of meteorological data required. Data requirements become more severe when models are applied to countries or locations in which networks of meteorological data are minimal. Therefore, it is desirable to develop a model for daily ET based on inputs that can be or have the potential for being estimated from spacecraft. Kanemasu, Stone, and Powers (1976) and Rosenthal, Kanemasu, Raney, and Stone (1977) modified Tanner and Jury's (1976) approach to estimating ET. Their approach was used to develop an ET model for winter wheat.

METHODS AND MATERIALS

Model Development

The evapotranspiration model described by Kanemasu et al. (1976) requires both soil and crop factors. Soil factors, obtained from lysimetric observation on bare soil or from weight changes due to water losses from large soil-filled containers, are used in Ritchie's (1972) model to estimate evaporation from the soil surface.

Evaporation from the soil surface is limited by energy supplied during the constant rate stage; therefore, an energy transmittance term (τ), based on leaf area index, is required. During the falling rate stage, evaporation rate is proportional to the square root of days after constant rate stage. The crop factors are used to estimate maximum evapotranspiration (ET_{max}) and transpiration. ET_{max}--the energy-limited ET occurring from a well-watered surface under nonadvective conditions--is given by Priestley and Taylor (1972) as

$$ET_{max} = \alpha\,[s/(s + \gamma)]R_n \qquad [1]$$

where α is a constant for a particular crop and climatic situation; γ is the psychrometer constant (mb/^{o}K); s is the slope of the saturation vapor pressure curve (mb/^{o}K) at mean temperature; and R_n is the 24-hr net radiation (mm/day). We evaluated α from lysimetric observations during periods of full canopy cover and wet soil surface (α = 1.35). When R_n was not measured, we estimated it from solar radiation R_s (mm day^{-1}) using the regression equations:

$$R_n = .959\ R_s - 3.61 \qquad [2]$$

and

$$R_n = .926\ R_s - 2.70 \qquad [3]$$

where [2] was developed for growth stages up to jointing and for the remainder of the season [3].

Transpiration was estimated by equations of the form given by Tanner and Jury (1976) and Kanemasu et al. (1976). When the available moisture content in the root zone was greater than 30% of field capacity, we used

$$T = \alpha_v(1-\tau)[s/(s + \gamma)]R_n \qquad \text{crop cover} < 50\% \qquad [4]$$

and

$$T = (\alpha-\tau)[s/(s + \gamma)]R_n \qquad \text{crop cover} > 50\% \qquad [5]$$

where α_v = 1.56; τ = exp (-.737 LAI) and LAI is leaf area index.

When the available moisture content was less than 30% field capacity, we linearly decreased the transpiration rate to zero at zero available moisture (Kanemasu et al., 1976).

Field Experiment

Winter wheat [*Triticum aestivum* (L)] was planted at the Evapotranspiration Research Field, 14 km southwest of Manhattan, Kansas, on October 16, 1974, and September 25, 1975. Cultivars planted were Cloud in 1974 and Plainsman V in 1975. A weighing lysimeter was located in the center of each 1-ha plot. Solar radiation, net radiation above and below the canopy, and temperature were measured at the site using a data-acquisition system. Leaf area index (LAI) was determined with an optical planimeter (Lambda Instruments) weekly except during dormancy, when monthly samples were sufficient. Regression equations for estimating net radiation from solar radiation (equations [2] and [3]) and τ from LAI were developed from detailed measurements at the Evapotranspiration Research Field, and then used in the ET model for other locations.

Adjacent to the lysimeter area, five 1-ha plots were sown on October 4, 1975, to Centurk, Sage, Trison, Arthur 71, and TAMU wheat 101.

We measured LAI and soil moisture on three large wheat fields (>40 ha) at three locations in 1974 and in 1975. Rooting zone depth as a function of time was estimated from dry weight of roots in 7.5-cm dia. soil cores (150 cm deep) sampled at dormancy, jointing, and heading stages (Fig. 1). Cores from at least three locations in the Centurk plot were taken at each sampling time. Roots were washed from soil and then oven-dried. At the lysimeter area, rooting depths were estimated by digging a trench and visually noting the deepest penetration. Visual observations agreed favorably with results indicated in Fig. 1.

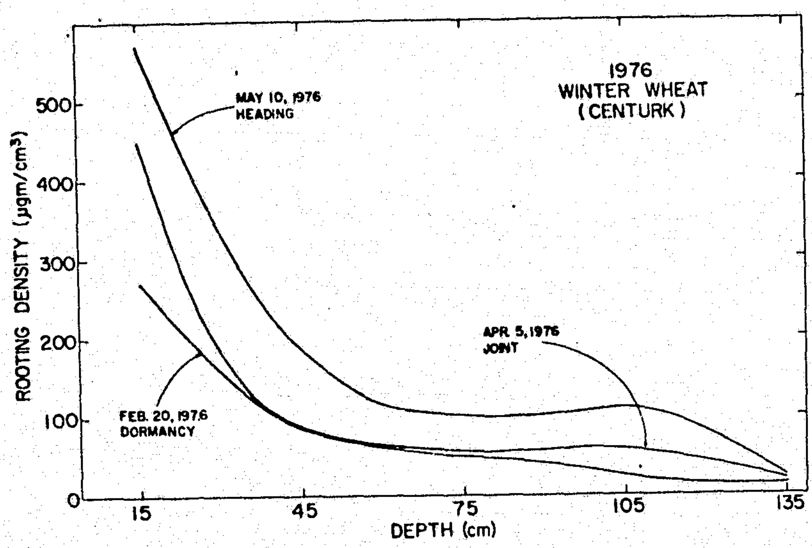


Fig. 1. Root densities of winter wheat at Manhattan, Kansas at dormancy, jointing, and heading, 1976.

Landsat I and II multispectral data were obtained from NASA for all cloud-free dates. Field boundaries in the areas listed in Table 1 were delineated using acetate overlays on gray-scale maps printed from computer compatible tapes (CCT). Digital counts from each pixel within a field for each multispectral scanner (MSS) wavelength band (Table 2) were read from CCT's (a pixel is approximately 0.5 ha).

Regression analyses were used to correlate the measured leaf area index (LAI) with digital counts in each MSS band, and we obtained the equation

$$LAI = 2.677-3.694(MSS\ 4/5)-2.309(MSS\ 4/6) + 5.751\ [MSS\ 4/(2x7)] + .043(MSS\ 5/6) -2.692[MSS\ 5/(2x7)] + 3.071[(MSS\ 4/5) - MSS\ 4/(2x7)]\ (MSS\ 4/5) \quad [6]$$

with an R^2 of 0.69 and a standard deviation of 0.42. The MSS band ratios are pixel by pixel averages; however, using field averages in [1] should not result in significant errors. Digital count data were not corrected for sun angle.

RESULTS AND DISCUSSION

Soil and crop parameters required in the model were determined during the 1974-75 season. Fig. 2 shows model-predicted and -observed soil moisture in the 150-cm profile. The completed model was compared with lysimetric observations during the 1975-76 season. The standard deviation of the difference between the model and lysimeter was found to be less than 0.5 mm day^{-1} (The 95 percent confidence interval was -0.2 to +0.2 mm day^{-1})

Fig. 3 shows seasonal, cumulative evaporation (E), transpiration (T), and evapotranspiration (ET) for a field in Colby, Kansas. Evaporation from the soil surface accounted for about 25% of the seasonal ET for winter wheat.

Table 1. Kansas commercial winter wheat fields used in evaluating evapotranspiration model

COUNTY	YEAR	CENTER COORDINATES
Riley	1974-76	96°37', 39°8'N
Ellsworth	1974-76	98°17.5'W, 38°43'N
Finney	1974-75	101°5.9'W, 39°9.6'N
Colby	1975-76	101°3'W, 39°24'N

Table 2. Spectral bands for the multispectral scanner (MSS) on Landsat

BAND	WAVELENGTHS
MSS 4	500 to 600 nm
MSS 5	600 to 700 nm
MSS 6	700 to 800 nm
MSS 7	800 to 1100 nm

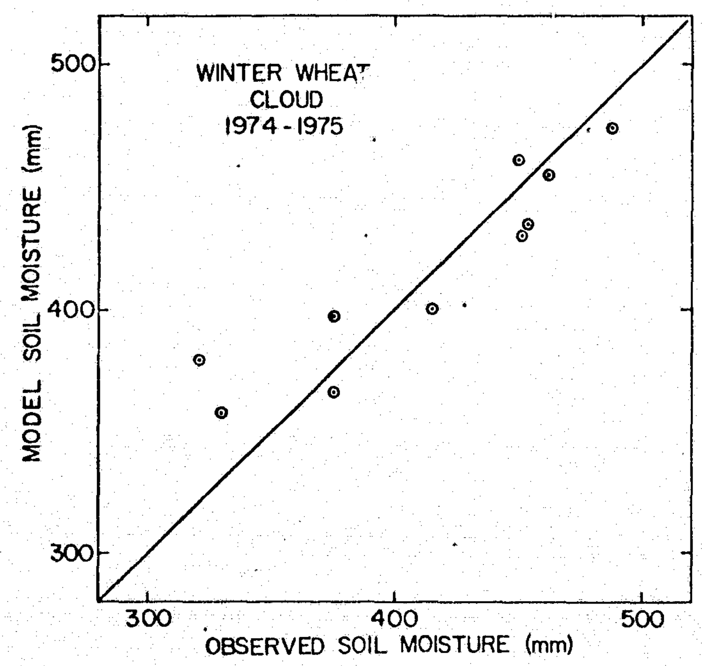


Fig. 2. Soil moisture (mm water in the 150 cm profile) estimated by the evapotranspiration model compared to observed values.

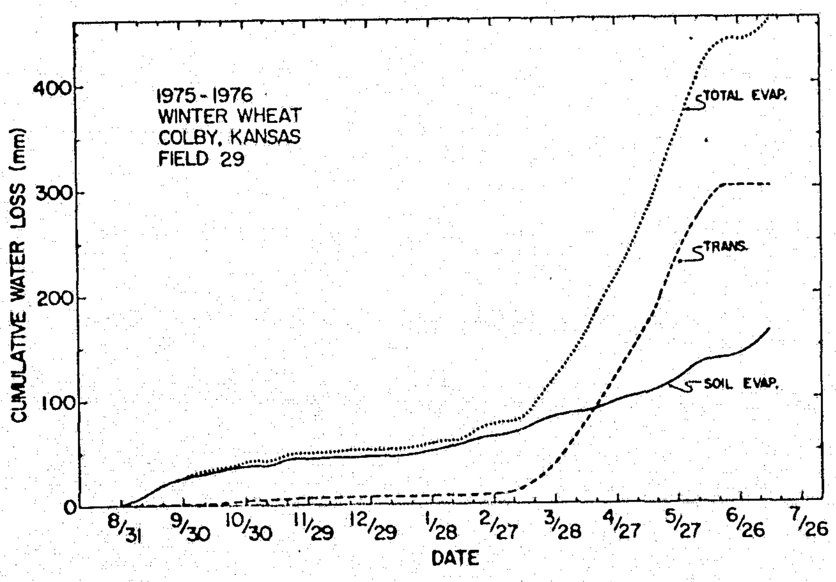


Fig. 3. Seasonal water loss on winter wheat at Colby, Kansas.

Fig. 4 compares LAI values predicted from [1] with ground measurements. Fig. 5 compares Landsat-predicted LAI's for a Riley and an Ellsworth county field with observed values. Simulating LAI throughout the season requires adequate satellite coverage. Usually, winter wheat LAI has two peaks: one in the fall which is rather broad and occurs when ET_{max} is rapidly declining; and one at heading time which is quite sharp and can be easily missed by Landsat coverage. In that transpiration does not increase so rapidly with increase in LAI at high LAI's as it does at low LAI's (LAI > 1.5), large errors do not result if the spring peak is missed.

The ET model was run on each field at each location (Table 1) using meteorological data from nearest weather stations and both observed and Landsat-predicted LAI. Monthly ET rates estimated with Landsat-predicted LAI agreed favorably with estimates using observed LAI (Table 3).

In Table 4, model estimates of monthly ET for five winter wheat cultivars at Manhattan, Kansas, are compared. Seasonal ET was approximately the same for all cultivars, with slight differences occurring during early spring.

SUMMARY

The evapotranspiration model described here for wheat potentially can be used on a regional basis. Because leaf area index can be obtained from spacecraft, ET estimates are responsive to many dynamic conditions (such as frost, drought, disease, insect damage) that are not accounted for by standard crop-coefficient models. Problems exist because of inadequate satellite coverage resulting because of clouds and delays in obtaining and analyzing data.

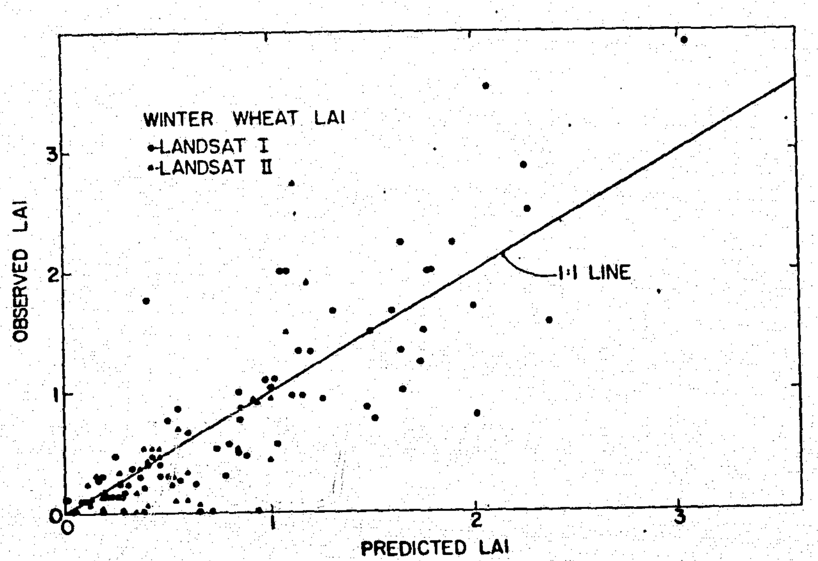
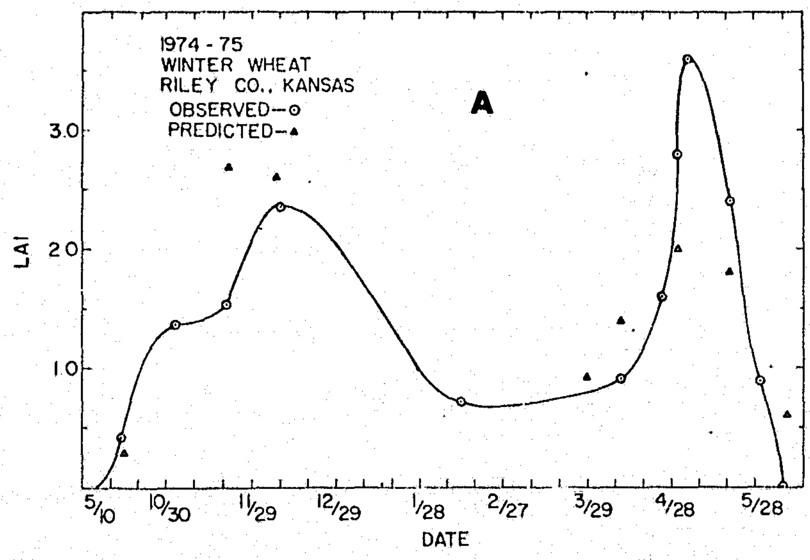


Fig. 4. Relation between observed leaf area index (LAI) and predicted LAI from Landsat using equation [6].



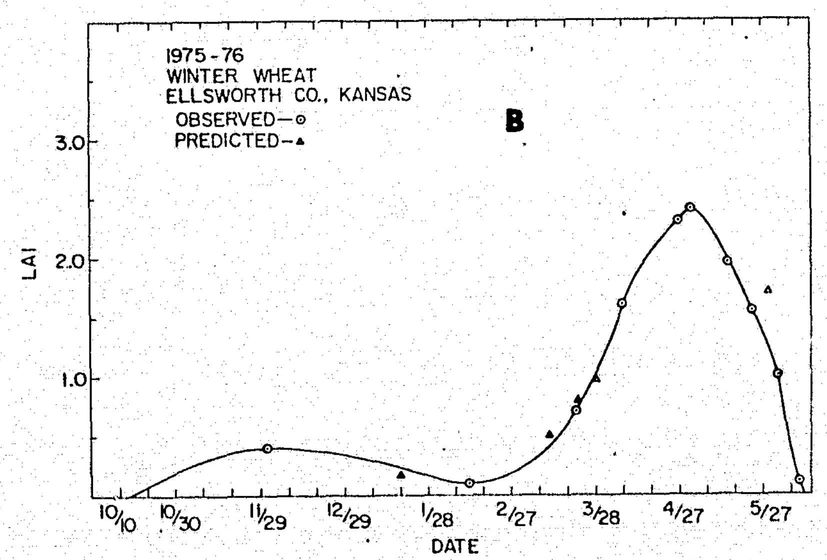


Fig. 5. Seasonal trends in observed leaf area index compared with Landsat predicted LAI from equation [6]. Solid line fitted through observed data points (A = Riley Co., B = Ellsworth Co.)

Table 3. Monthly evapotranspiration rates (mm) estimated from ET model using observed LAI and Landsat-predicted LAI.

1975-76	RILEY OBS.	RILEY LANDSAT	THOMAS OBS.	THOMAS LANDSAT	ELLSWORTH OBS.	ELLSWORTH LANDSAT
Sept.	35.7	35.6	17.1	17.4	25.9	25.9
Oct.	25.9	26.2	24.9	23.2	16.0	16.0
Nov.	9.2	9.4	10.6	9.5	10.1	10.6
Dec.	3.8	3.7	3.8	3.6	4.2	4.2
Jan.	7.4	7.2	10.7	8.8	8.2	8.4
Feb.	22.1	20.7	27.7	21.7	18.9	22.0
Mar.	62.8	58.1	34.4	26.3	46.8	46.9
Apr.	101.1	91.9	82.1	75.5	88.5	84.1
May	141.3	147.2	131.8	132.1	120.2	125.1
June	73.5	89.3	83.3	85.4	56.8	84.8
July	0	0	3.5	3.3	17.6	17.7
	482.6	489.3	429.8	406.7	413.2	446.4

Table 4. Model evapotranspiration estimates for 5 winter wheat cultivars at Manhattan, Kansas

DATE	EVAPOTRANSPIRATION (mm)				
	CENTURK	TRISON	ARTHUR 71	SAGE	TAMU WHEAT 101
10/30/74	25.1	25.1	25.1	25.1	25.1
11/30/74	7.8	8.4	8.4	7.8	7.8
12/31/74	1.9	1.9	1.9	1.8	1.9
1/31/75	4.3	4.5	4.5	4.3	4.3
2/28/75	21.1	19.8	19.8	21.0	21.0
3/31/75	44.7	51.9	50.1	47.8	49.3
4/30/75	96.1	94.3	89.3	92.5	98.3
5/31/75	176.7	172.3	178.4	173.3	174.9
6/21/75	54.7	55.7	54.8	55.5	50.0
Total (mm)	432.4	434.0	432.3	429.1	432.6

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APPENDIX B

EVALUATING SOIL MOISTURE AND YIELD OF WINTER WHEAT IN THE GREAT PLAINS USING LANDSAT DATA

EVALUATING SOIL MOISTURE AND YIELD OF WINTER WHEAT IN THE GREAT PLAINS USING LANDSAT DATA

ABSTRACT

Locating areas where soil moisture is limiting to crop growth is important for estimating winter-wheat yields on a regional basis. In the 1975-76 growing season, we evaluated soil-moisture conditions and winter-wheat yields for a five-state region of the Great Plains using satellite (LANDSAT) estimates of leaf area index (LAI) and an evapotranspiration (ET) model described by Kanemasu et al. (1977). Because LAI was used as an input, the ET model responded to changes in crop growth. Estimated soil-water depletions were high for the Nebraska Panhandle, southwestern Kansas, southeastern Colorado, and the Texas Panhandle. Estimated yields in the five-state region ranged from 1.0 to 2.9 metric ton/ha.

INTRODUCTION

Soil-water availability greatly affects growth and yield of winter wheat in the Great Plains. To estimate winter wheat yields, it is important first to delineate areas where soil moisture is limiting to growth.

The Crop Moisture Index (CMI) is commonly used by National Oceanographic and Atmospheric Administration (NOAA) to provide weekly estimates of availability of moisture to meet agricultural demands. However, the CMI is a general index and does not respond to the growth of a specific crop.

To evaluate the soil-moisture status for winter wheat on a regional basis, we used satellite (LANDSAT) data and an evapotranspiration (ET) model. We compared results with the Crop Moisture Index, and assessed the impact of moisture-limiting conditions on growth and yield of winter wheat.

MATERIALS AND METHODS

Table 1 shows moisture conditions at planting (for the 1975-76 growing season) in 22 sample segments in five Great Plains states. They are part of the Large Area Crop Inventory Experiment (LACIE) tri-agency (USDA, NASA, NOAA) project being conducted at Johnson Space Center. Photo-interpretation of LANDSAT imagery was used to select a limited number of fields in the sample segments that are identified as wheat and non-wheat.

We used the evapotranspiration (ET) model patterned after approaches by Kanemasu, Stone, and Powers (1976) and Tanner and Jury (1976), and found by Kanemasu et al. (1977) to be accurate in estimating ET and soil moisture for winter wheat. Model inputs were daily estimates of solar

Table 1. Location of sample segments and soil-water contents there at planting in 1975.

State	County	No. of fields	Soil-water content at planting (mm)
Texas	Hale	9	416
	Swisher	16	409
	Hutchinson	6	300
	Bailey	11	392
Oklahoma	Comanche	7	330
	Tillman	15	467
	Jefferson	9	540
Kansas	Kingman	6	330
	Stevens	8	271
	Osborne	12	525
	Sheridan	10	355
	Grant	10	298
	Kearny	20	301
	Edwards	10	343
	Reno	5	390
Colorado	Prowers	7	289
	Baca	4	309
Nebraska	Deuel	8	479
	Garden	11	449
	Chase	8	525
	Keith	10	495
	Dundy	9	512

radiation, maximum and minimum temperature, precipitation, and leaf area index (LAI). Model outputs were potential evapotranspiration (ET_{max}), transpiration, soil evaporation, ET, runoff, drainage, and soil moisture in the 0 to 150 cm profile.

ET_{max} (mm) was calculated using the equation

$$ET_{max} = \alpha[s/(s+\gamma)]R_n, \qquad [1]$$

where α is a unitless proportionality constant for a particular crop and climatic situation (1.35 for winter wheat), s is the slope of the saturation vapor pressure curve (mb/°K) at mean temperature, γ is the psychrometric constant (mb/°K), and R_n is 24-hr net radiation (mm water/day). R_n was estimated from solar radiation using regression equations (Kanemasu et al., 1977).

During stage 1 evaporation (constant rate phase), soil evaporation was calculated using the equation

$$E_o = (\tau/\alpha)ET_{max}, \qquad [2]$$

where E_o is daily soil evaporation (mm), τ is an energy transmittance term equal to exp(-.737 LAI). Equation [2] was used until the upper limit (U) of stage 1 evaporation was reached. During the falling rate phase (stage 2) evaporation was calculated using the equation

$$E = ct^{1/2} - c\,(t-1)^{1/2} \qquad [3]$$

where c (mm day$^{-1/2}$) depends on the hydraulic properties of the soil and t is days after stage 1 evaporation. Table 2 summarizes soil constants for the LACIE sample segments.

Transpiration (mm) was calculated using the equations

$$T = \alpha_v(1-\tau)[s/(s+\gamma)]R_n \qquad [4]$$

Table 2. Soil properties of the sample segments.

County	Soil texture	c (mm day$^{-1/2}$)	U (mm)	Field capacity (mm)	Maximum available water (mm)
Garden, Deuel Dundy, Chase Keith	Fine silty clay	3.5	10.0	525	225
Stevens, Kingman Comanche, Hutchinson	Sandy loam	2.5	11.0	330	180
Sheridan, Osborne Reno, Edwards Grant, Kearny Prowers, Baca	Silty clay loam	3.5	16.0	525	300
Swisher, Hale Jefferson, Bailey Tillman	Clay loam	4.0	19.0	540	285

for crop cover less than 50% and

$$T = (\alpha - \tau)[s/(s+\gamma)]R_n \qquad [5]$$

for crop cover greater than 50% where $\alpha_v = 1.56$. Equations [4] and [5] were used when the mm of available soil moisture (θ_a) in the profile were greater than 35% of the maximum available soil moisture (θ_{max}). When θ_a was less than 35% of θ_{max}, equations [4] and [5] were multiplied by K_s, given as

$$K_s = \frac{\theta_a}{0.35\ \theta_{max}} . \qquad [6]$$

Soil moisture was calculated from the water balance. Initial soil water contents at planting (Table 1) were estimated from the previous 15 months' precipitation.

Leaf area indices were estimated from LANDSAT multispectral data obtained from NASA for all cloud-free dates (Kanemasu et al. 1977). LAIs for each field within a sample segment were calculated using field averages of digital counts in each multispectral scanner (MSS) wavelength band (Table 3) and the regression equation

$$\mathrm{LAI} = 2.677-3.694(\mathrm{MSS}\ 4/5)-2.309(\mathrm{MSS}\ 4/6)+5.751[\mathrm{MSS}\ 4/(2\mathrm{x}7)]+0.043(\mathrm{MSS}\ 5/6)$$
$$-2.692[\mathrm{MSS}\ 5/(2\mathrm{x}7)]+3.071[(\mathrm{MSS}\ 4/5)-\mathrm{MSS}\ 4/(2\mathrm{x}7)](\mathrm{MSS}\ 4/5). \qquad [7]$$

The quantities in parenthesis in equation [7] represent digital-count ratios of the MSS wavelength bands. (Digital counts in band 7 were multiplied by 2). Equation [7] (R^2=0.69) was developed from 110 observations of LAI in Kansas (Kanemasu et al. 1977). LAIs for the fields within a sample segment, calculated using [7], were averaged to obtain an average LAI for the sample segment for each LANDSAT overpass. Daily values of LAI for each segment, used in the ET model, were estimated from graphs of average LAI versus date. Examples

Table 3. Spectral bands for the LANDSAT multispectral scanner (MSS).

Band	Wavelength (μm)
MSS 4	0.5 to 0.6
MSS 5	0.6 to 0.7
MSS 6	0.7 to 0.8
MSS 7	0.8 to 1.1

of LAI graphs are shown in Fig. 1.

Yields were estimated using the equation

$$\text{Yield(metric tons/ha)} = 0.192(\Sigma(T/ET_{max}))_1^{0.172} \cdot (\Sigma(T/ET_{max}))_2^{0.104} \cdot (\Sigma(T/ET_{max}))_3^{0.646} \quad [8]$$

where the subscripts 1, 2, and 3 denote, respectively, these growth stage intervals: emergence to jointing, jointing to heading, and heading to soft dough[2/]. Equation [8] (R^2 = .54), developed from field data in Kansas, has not been rigorously tested.

RESULTS AND DISCUSSION

The ET model uses inputs that can be easily obtained and that can be estimated from spacecraft. Because LAI, used as a model input, can be estimated from satellites, the ET model will respond to dynamic conditions affecting growth of winter wheat.

We found soil-water depletion to be a useful ET-model output for evaluating moisture conditions for winter wheat. Percent depletion (% DEPL) is defined as

$$\%DEPL = \left(\frac{\theta_{max} - \theta_a}{\theta_{max}}\right) X\ 100\ . \quad [9]$$

Soil-water depletion is related to crop condition in that it considers both water-holding capacity of soil and water availability to the plant.

ET-model estimates of soil-water depletion on Oct. 1, 1975, the approximate planting date at most locations, are shown in Fig. 2. Model estimates of %DEPL indicated that, assuming photosynthesis was reduced proportionally with transpiration (K_s<1), moisture was limiting to

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2/ Kanemasu, E. T. 1977. Application of information on water-soil-plant relations to use and conservation of water. Kansas Contributing Report, Western 67 (Revised).

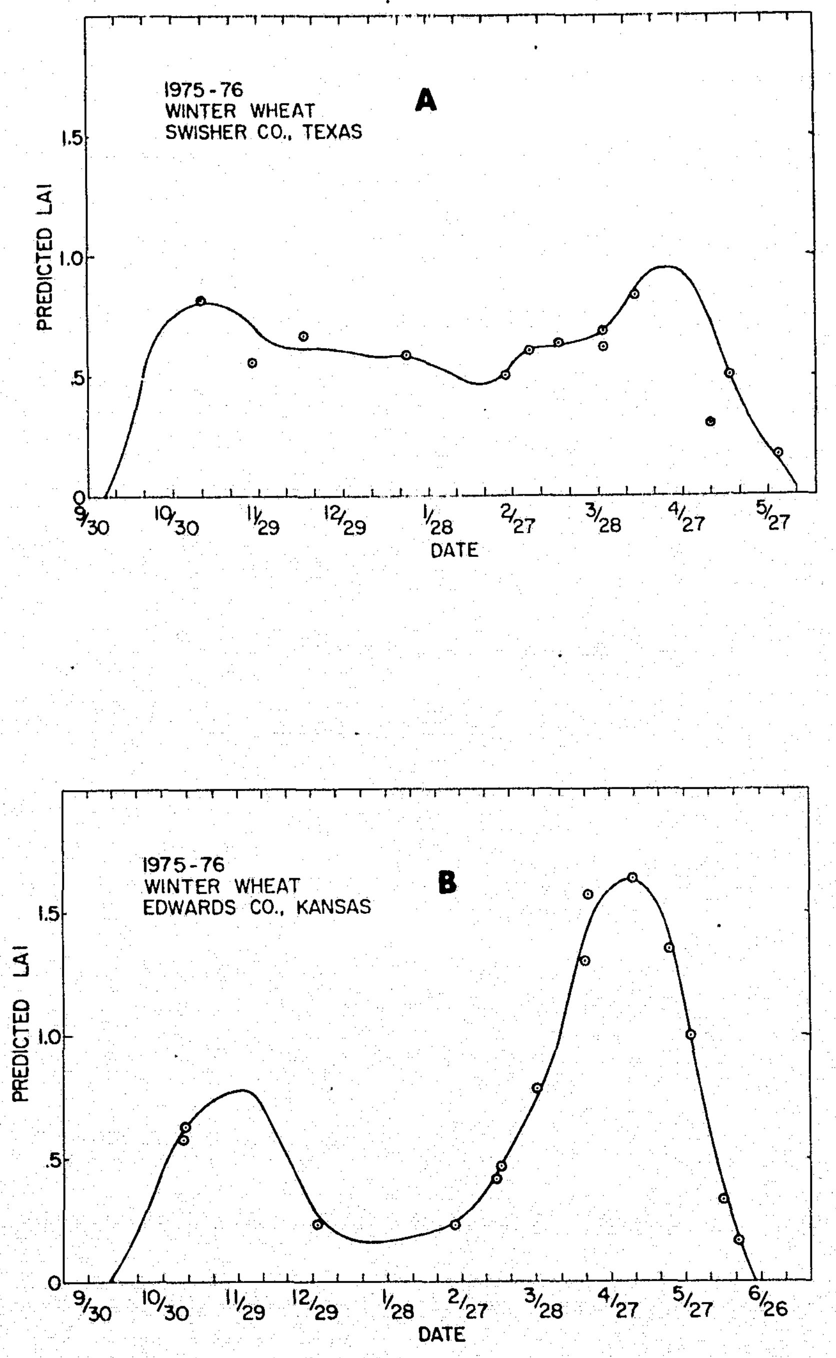


Fig. 1. Landsat estimates of LAI for Swisher County, Texas (A) and Edwards County, Kansas (B).

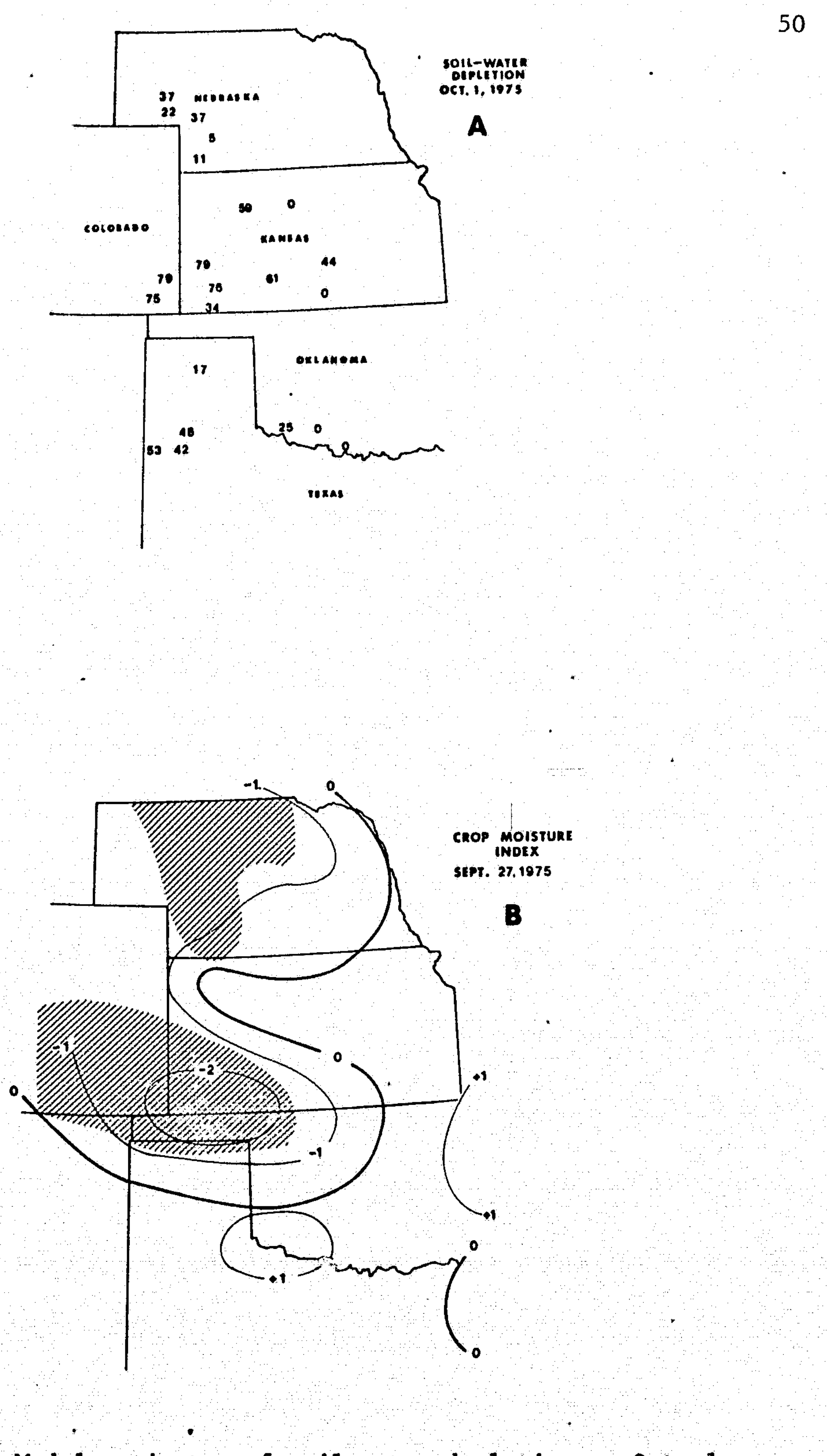


Fig. 2. Model estimates of soil-water depletion on Oct. 1, 1975 (A); compared with Crop Moisture Index on Sept. 27, 1975 (B). Positive indices indicate that moisture supplies exceeded agricultural requirements; negative values, that demand exceeded available supplies. Shaded areas indicate the index was unchanged or increased from the previous week's value.

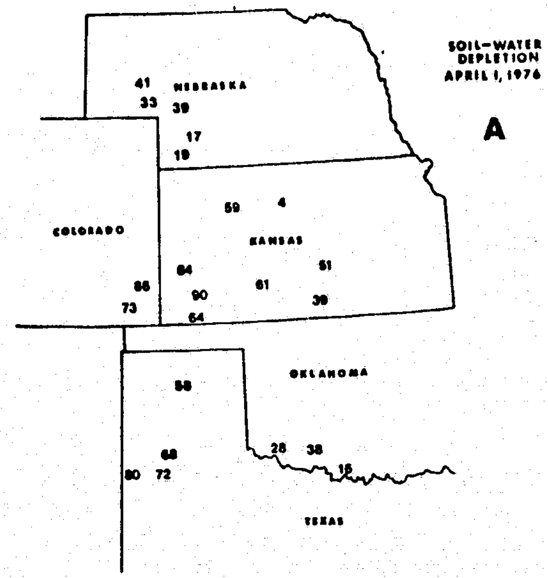
winter-wheat growth in southwestern Kansas and in southeastern Colorado.

Model estimates of %DEPL provided more accurate estimates of the actual moisture conditions for winter wheat than did the weekly Crop Moisture Index (CMI). Fig. 2 shows CMI values for Sept. 27, 1975. (Interpretation guidelines for CMI are listed in Table 4.) Positive indices indicated that moisture supplies exceeded agricultural requirements; negative values, that demand exceeded available supplies. Although the CMI showed dry conditions in the same areas as did the ET model, it was difficult to use CMI to assess the magnitude and effect of deficit conditions on growth of winter wheat.

Fig. 3 shows model estimates of soil-water depletion on the approximate jointing date, April 1, 1976. Moisture-limiting conditions existed in southwestern Kansas, southeastern Colorado, and in the Texas Panhandle. We concluded that, because of high %DEPL at jointing in the above-mentioned areas, growth and development of wheat were restricted.

The Crop Moisture Index on April 3, 1976 (Fig. 3) showed dry conditions in Texas, and in portions of Kansas and Colorado. Because the CMI did not indicate actual moisture conditions for winter wheat on April 3, it was difficult to assess severity and impact of the dry conditions on wheat growth using the Crop Moisture Index.

Model estimates of soil-water depletion on May 15, 1976 (the approximate heading date) were greater than 70% in southwestern Kansas, southeastern Colorado, and in the Texas and Nebraska Panhandles (Fig. 4). Because of the dry conditions at the approximate time of heading, we expected there would be yield reductions in the those areas. The Crop Moisture Index on May 15 (Fig. 4), however, showed dry conditions



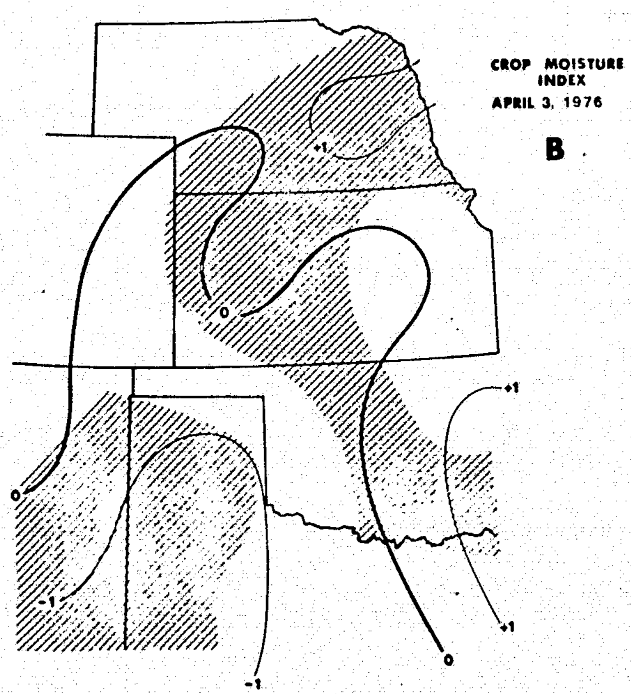


Fig. 3. Model estimates of soil-water depletion on April 1, 1976 (A); compared with Crop Moisture Index on April 3, 1976 (B). Positive indices indicate that moisture supplies exeeded agricultural requirements; negative values, that demand exceeded available supplies. Shaded areas indicate the index was unchanged or increased from the previous week's value.

Table 4. General guidelines from National Weather Service for interpreting Crop Moisture Index.

Unshaded areas: index decreased	
Above 3.0	Some drying but still excessively wet
2.0 to 3.0	More dry weather needed, work delayed
1.0 to 2.0	Favorable, except still too wet in spots
0 to 1.0	Favorable for normal growth and fieldwork
0 to -1.0	Topsoil moisture short, germination slow
-1.0 to -2.0	Abnormally dry, prospects deteriorating
-2.0 to -3.0	Too dry, yield prospects reduced
-3.0 to -4.0	Potential yields severely cut by drought
Below -4.0	Extremely dry, most crops ruined
Shaded areas: index increased or did not change	
Above 3.0	Excessively wet, some fields flooded
2.0 to 3.0	Too wet, some standing water
1.0 to 2.0	Prospects above normal, some fields too wet
0 to 1.0	Moisture adequate for present needs
0 to -1.0	Prospects improved but rain still needed
-1.0 to -2.0	Some improvement but still too dry
-2.0 to -3.0	Drought eased but still serious
-3.0 to -4.0	Drought continues, rain urgently needed
Below -4.0	Not enough rain, still extremely dry

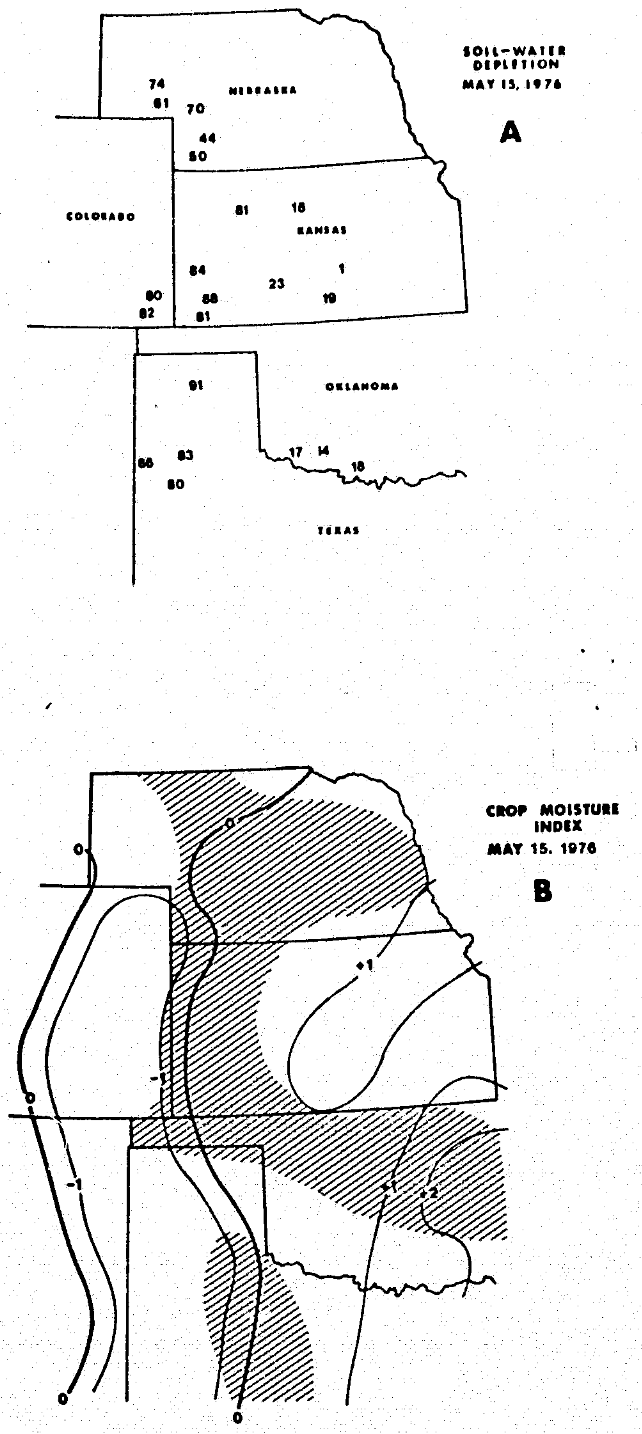


Fig. 4. Model estimates of soil-water depletion on May 15, 1976 (A); compared with Crop Moisture Index (B) on the same date. Positive indices indicate that moisture supplies exceeded agricultural requirements; negative values, that demand exceeded available supplies. Shaded areas indicate the index was unchanged or increased from the previous week's value.

only in portions of Colorado and Texas.

As expected, yields estimated from equation [8] were lowest in the sample segments with high soil-water depletion at jointing and heading. Predicted yields in the 22 sample segments ranged from 1.0 to 2.9 metric tons/ha (Fig. 5). Generally, predicted yields agreed favorably with average county yields estimated by the Statistical Reporting Service (SRS) (Fig. 6). Because equation [8] assumed that moisture was the primary limiting factor to wheat growth, predicted yields were closest to SRS estimates for those areas where soil-water depletion was high. For areas of adequate moisture (Oklahoma and portions of Kansas), predicted yields were higher than SRS estimates. Discrepancies may also have occurred because fields within some sample segments may not have been representative of fields in the rest of the county.

This study has shown that soil-moisture conditions and growth of winter wheat can be evaluated on a regional basis using satellite data. Because leaf area index (estimated from LANDSAT) is used as an input, the evapotranspiration model responds to changes in crop growth. Soil-water depletion, estimated using the ET model, is a measure of water availability for crop growth and is an important term in yield prediction.

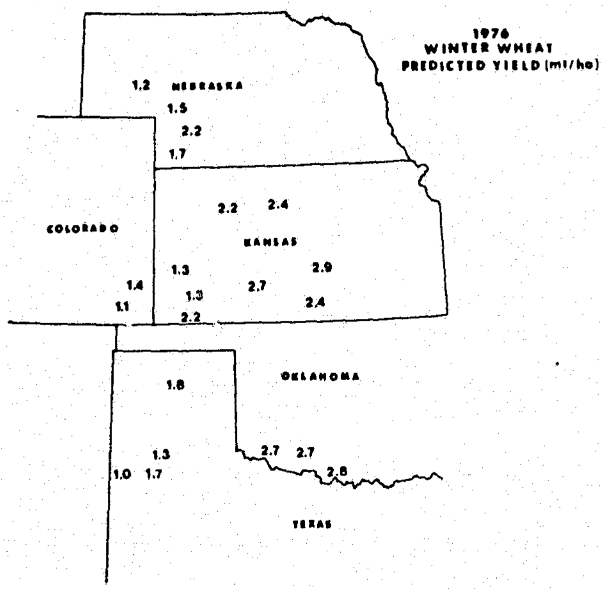


Fig. 5. Winter wheat yields (metric tons/ha) predicted (using LANDSAT) for the 22 sample segments in 1976.

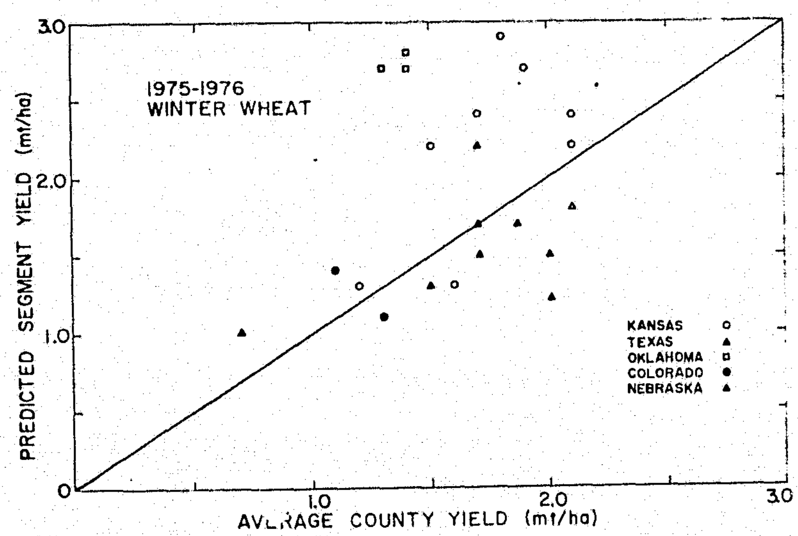


Fig. 6. Predicted winter wheat yields in metric tons/ha compared with average county yields estimated by the Statistical Reporting Service.

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APPENDIX C

MODELLING DAILY DRY MATTER PRODUCTION OF WINTER WHEAT

MODELLING DAILY DRY-MATTER PRODUCTION OF WINTER WHEAT

ABSTRACT

Applicability of many plant growth models are limited because of the requirements in input data. Photosynthesis and respiration equations were developed from meteorological data that could easily be obtained. The single crop parameter required was leaf area index. These equations were developed for winter wheat from measurement of net carbon dioxide exchange with field chambers and an infrared-gas-analysis system. Higher gross photosynthesis rates after jointing were attributed to sink enhancement of photosynthesis. Respiration was estimated as a photosynthesis-dependent growth component and a temperature-biomass dependent maintenance component. The equations predicted dry-matter production that agreed favorably with observed dry matter accumulation.

Key words:

Winter wheat, Gross photosynthesis, Respiration, Dormancy, Photosynthetic efficiency, Sink capacity.

INTRODUCTION

Plant growth and yield result from the interaction of environmental factors, inherited traits of the plant, and current condition of the plant. Using models to study plant growth allows several factors to be varied at once. Models may be used to test theories of plant growth (Milthorpe and Moorby, 1974), to estimate yield, or to make crop production decisions. The simplest yield model involves summing or averaging several variables over the growing season and correlating those variables with yield by multiple regression. That approach requires a large number of crop cycles to develop a data base (Haun, 1974). More complex models may attempt to simulate individual plant processes on a daily basis (Milthorpe, Moorby and Morgan, 1974). For such models, equations to estimate daily photosynthesis and respiration are essential.

This study was designed to develop, for winter wheat, daily growth equations estimating photosynthesis and respiration based on net carbon dioxide exchange (NCE) measurements, to be incorporated into an evapotranspiration-growth-yield model. Our objectives were:

1. To investigate whether or not photosynthesis and respiration change as functions of growth stage.
2. To develop and test equations estimating photosynthesis, respiration, and dry-matter accumulation as functions of leaf area index (LAI) and meteorological variables.

METHODS AND MATERIALS

On 25 Sept. 1975, 1 ha plots of *Triticum aestivum* L. cvs. Plainsman V and Centurk were planted, each at seeding rates of 34 kg ha^{-1}

and 67 kg ha^{-1} at the Evapotranspiration Research Field 14 km southwest of Manhattan in Riley county, Kansas. On 1 Oct. 1974, 5 cultivars (Centurk, Tamu, Trison, Sage, and Arthur) were plantedat the site at 67 kg ha^{-1}. While detailed measurements were made at the Evapotranspiration Research plots, less detailed measurements were made on commercial fields (in Riley, Ellsworth, and Finney counties) planted to Scout in late September to early October of 1974 and of 1975.

From 25 Sept. 1975 to 24 Nov. 1975, and from 1 Mar. 1976 to 15 June 1976 net carbon dioxide exchange (NCE) was measured with 4 open-chamber systems and two infrared-gas analyzers (Uras II, Intertech Corp.). Every 20 minutes each analyzer was switched between two chambers with an electronically timed, solenoid valve system, previously described by Sij, Kanemasu, and Teare (1972) and by Kanemasu, Powers, and Sij (1974). Each chamber enclosed an area of 1.2 m^2, including approximately 200 or 400 wheat plants, depending on the seeding rate; so the NCE values represented the effects of many plants. The chambers were moved to new locations at intervals (no longer than 14 days), depending on growth stage and weather. Soil was packed along the outside of each chamber to prevent large air leaks. The air circulation rate through the chamber, measured daily, was about 2.2 m^3 min^{-1} (air exchange about 1.2 times per min). In an earlier study (Kanemasu and Hiebsch, 1975) dry matter estimated from chamber measurements agreed within about 10% of observed dry matter from jointing to heading.

Based on measurements taken in the spring and fall of 1975, soil respiration or carbon dioxide flux in mg CO_2 dm^{-2} 12 hr^{-1} from bare soil (without roots) was estimated as:

$$\text{Soil respiration} = -7.2 - 1.15\ (\text{TMAX} + \text{TMIN})/3 \qquad [1]$$

during the night and

$$\text{Soil respiration} = -15.11 - 0.65\ (2\text{TMAX} + \text{PTMIN})/3 \qquad [2]$$

during the day where TMAX, TMIN, and PTMIN are maximum and minimum daily temperatures and previous daily minimum temperature in C. These equations give values ranging between those found by Kanemasu et al. (1974) during summer at the Evapotranspiration Research field (-3 $mgCO_2$ dm^{-2} hr^{-1}) and by Biscoe et al. (1975b) during spring and summer in England (-1.1 $mgCO_2$ $dm^{-2}hr^{-1}$).

The number of chambers available precluded gathering replicated NCE values. The 20-minute readings were continuously recorded for each treatment for each day. Some data were discarded because of rapidly changing carbon dioxide concentration, probably caused by fluctuating atmospheric conditions (inversion with low wind). During May and June, 1976, the solenoid valves from one chamber malfunctioned.

To calculate leaf area index (LAI) and above ground dry matter accumulation we sampled plants weekly on the Riley county fields and approximately twice monthly on the Ellsworth and Finney county fields -- except during December, January, and February, when samples were taken less frequently on all fields. Leaf area was measured with an optical planimeter (Lambda Instruments). From heading to approximately hard-dough stage, 0.025 was added to LAI values to account for the photosynthetic area of the heads (including awns).

Solar radiation (SR) was measured at Manhattan for the Riley county and Ellsworth county fields and at Dodge City for the Finney county fields. A thermograph was used to measure maximum and minimum temperatures at the Evapotranspiration Research field. At Garden City and

Ellsworth, the National Weather Service temperature records were used.

Light interception of the canopy was measured with one sensor (Lambda Instruments) pointing upward to measure incoming photosynthetically active radiation (PAR), one sensor pointing down from two meters height to measure reflected PAR (RPAR), five sensors in parallel pointing upward at different positions underneath the canopy to measure transmitted PAR (TPAR), and five sensors in parallel facing downward beneath the canopy to measure PAR reflected from the soil (RSPAR). Intercepted PAR (IPAR) was calculated as

$$IPAR = PAR - RPAR - TPAR + RSPAR \qquad [3]$$

where PAR is in micro Einsteins cm^{-2} $day.^{-1}$ One Einstein is one mole of photons. For most of the growing season, RSPAR was small.

A biometeorological time scale (Feyerherm and Paulsen, 1976)[3/] was used to estimate date of emergence (1), jointing (2), heading (3), soft ripe (4), and maturity (5) on fields where ontogeny data were not recorded (Ellsworth and Finney counties).

Because of the similarity of the pathways of photosynthesis and transpiration, the responses to water stress are similar. An evapotranspiration model for sorghum and soybean (Kanemasu, Stone, and Powers, 1976), adapted to winter wheat, was used to estimate the effect of water stress on photosynthesis. Gross photosynthesis (GP) was assumed to be reduced by a water stress factor (K_s)

$$K_s = \theta/.35\max \qquad (\theta < .35\max) \qquad [4]$$

$$K_s = 1 \qquad (\theta \geq .35 \max) \qquad [5]$$

where θ is available soil water and θ max is the available soil water at field capacity.

3/Feyerherm, A. M. and G. M. Paulsen. 1976. A biometeorological time scale applied to winter wheat. Agron. Abstr. p. 9.

RESULTS AND DISCUSSION

Model Development

The NCE measurements were corrected for soil respiration according to [1] and [2] and integrated to obtain the 24 hour NCE estimate (TNCE). TNCE is then the algebraic sum of the daytime NCE (DNCE) and the negative nighttime NCE. We estimated the nighttime NCE or dark respiration (NResp) as:

$$NResp = (N_L)(-0.276 - 0.0148\ DNCE - M_n \times DM) \qquad [6]$$

where NResp is the nighttime flux of CO_2 (mg dm^{-2}day^{-1}); N_L is the night length in hours; DNCE is gross photosynthesis minus the daytime respiration (mg dm^{-2}day^{-1}); DM is the accumulated above- and below-ground dry matter (mg cm^{-2}) until maximum LAI (MLAI) is attained; thereafter DM is multiplied by LAI/MLAI. Thus, when all leaves have senescenced, the maintenance component is zero. The "maintenance" coefficient (Mn) is temperature dependent and of the form

$$Mn = .002329 + 8.172 \times 10^{-6} \times T_n + .2329 \times 10^{-6} \times T_n^2 \qquad [7]$$

where T_n is $(T_{max} + 2T_{min})/3$. T_{max} and T_{min} are the 24 hour maximum and minimum temperatures in degrees Kelvin. Equation [6] -- evaluated by using chamber measurements of DNCE, night respiration, observed dry matter, and temperature data -- resulted in an $r^2 = 0.74$.

Daytime respiration (DResp) can be expressed by [6] with daylength substituted for nightlength, gross photosynthesis (GP) substituted for DNCE, and M_d substituted for M_n. M_d is given by [7] with $T_m = (2T_{max} + PT_{min})/3$ substituted for T_n. PT_{min} is the previous daily minimum temperature in degrees Kelvin.

McCree (1974) estimated respiration for sorghum and white clover with equations of the form

$$Resp = a\ DNCE + b\ DM \qquad [8]$$

where a is a growth coefficient and b is a temperature dependent maintenance coefficient. Table 1 compares the maintenance and growth coefficients for wheat with those of McCree's over a range of temperatures. The wheat coefficients were less sensitive to temperature than those of sorghum and white clover, probably because wheat is a cool season crop.

Gross photosynthesis (GP) depends to a large extent on the number of photons or quanta of light intercepted by the canopy. Shown in Fig. 1 is the relationship between intercepted PAR (IPAR) and leaf area index (LAI). IPAR can be expressed as

$$IPAR = .5739\ PAR\ LAI^{.3296} \qquad LAI \leq 4.6 \qquad [9]$$

with $r^2 = .87$ and

$$IPAR = .95\ PAR \qquad LAI > 4.6 \qquad [10]$$

where IPAR and PAR are given in $\mu E\ cm^{-2}\ day^{-1}$. Estimating light interception by the point quadrants method (Wilson, 1967) while probably more accurate, would require measurement of leaf angle distribution or mean leaf angle, so was not used.

When PAR was not measured, PAR was estimated from daily solar radiation (SR) by the relationship

$$PAR = 9.07\ SR \qquad [11]$$

where SR is in $ly\ day^{-1}$. Equation [11] was obtained from SR and PAR measurements at the Evapotranspiration Research site. Therefore, from measurements of solar radiation and LAI, intercepted PAR can be estimated.

Gross photosynthesis (GP), was estimated for various growth stages

Table 1. Maintenance and growth coefficients for sorghum and white clover (McCree, 1974) and winter wheat (from $0^{o}C$ to $30^{o}C$ when daylength is 12 hours) compared.

TEMPERATURE	MAINTENANCE COEFFICIENTS		
(^{o}C)	Sorghum	White Clover	Wheat
0	0.02	0.06	0.26
10	0.09	0.23	0.28
20	0.26	0.69	0.30
30	0.54	1.43	0.31
	GROWTH COEFFICIENTS		
	Sorghum	White Clover	Wheat
	0.14	0.14	0.18

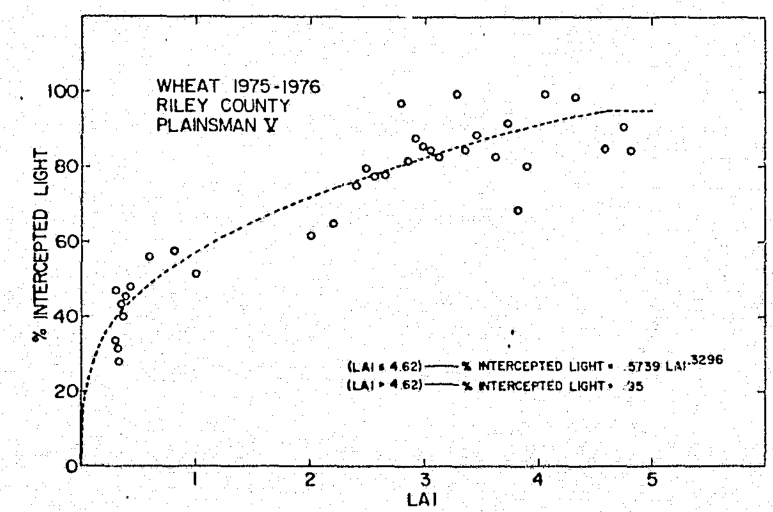

Figure 1. Percent intercepted light plotted against leaf area index (LAI) for Plainsman V.

by using the chamber and light-interception data. Following Biscoe et al. (1975a) monomolecular equations were used to estimate the photosynthetic response to intercepted light. From emergence to jointing

$$GP = K_s[415 - 434 \exp(-.000276 \times IPAR)] \quad [12]$$

with $r^2 = .84$, where K_s is the water stress factor from [4] and [5], GP is given in mg CO_2 $dm^{-2}day^{-1}$. During cold days ($T_{max} < 5$ C), GP = 0 (Martin and Leonard, 1967). From jointing to maturity and LAI $\geq$ 1.5,

$$GP = K_s\ [1047 - 865 \exp\ (-.000132 \times IPAR)] \quad [13]$$

with $r^2 = .68$. If LAI < 1.5, [12] is used.

Table 2 illustrates the difference in photosynthesis, respiration, and daily dry-matter accumulation (DMP) (calculated by [15]) from the prejointing and postjointing photosynthesis equations. The difference in gross photosynthesis between equations [12] and [13] may be due to sink enhancement of photosynthesis (Evans and Dunstone, 1970) after jointing. Clearly, [12] and [13] provide unreasonable estimates of GP at zero IPAR; however, under our field conditions the errors involved were minor. GP was not allowed to be negative.

Estimated daily gross photosynthesis and respiration are summed in Table 3 by growth stage. Denmead (1976) estimated that a spring wheat crop had 13827 mg CO_2dm^{-2} daytime net photosynthesis and 5544 mg CO_2 dm^{-2} nighttime respiration from one week before heading to 26 days after heading. For Plainsman V, the values from heading to 35 days after heading were (Table 3) 13980 mg CO_2dm^{-2} daytime net photosynthesis and 4151 mg CO_2dm^{-2} nighttime respiration. Biscoe et al. (1975a) reported 10450 mg CO_2dm^{-2} daytime net photsoynthesis and 2550 mg CO_2dm^{-2} nighttime respiration spring barley for a similar period. For the season (emergence to soft ripe), 46.8% of the gross photsynthesis was

Table 2. Model estimates of gross photosynthesis (GP), day and night respiration (Resp), and daily dry matter production (DMP) for a range of intercepted light values when accumulated dry matter is 50 mg cm^{-2}, Tm is 27°C / Tn is 22C, and daylength is 12 hours.

Prejointing

IPAR		GP[2]	Resp[4]	DMP[5]
$\mu E\ cm^{-2}\ day^{-1}$		$mg\ dm^{-2}\ day^{-1}$		$mg\ cm^{-2}$
0	(0)[1]	-19	-32	-0.09
1814	(200)	152	-77	0.51
3628	(400)	255	-106	0.99
4535	(500)	291	-117	1.17

Postjointing

IPAR		GP[3]	Resp[4]	DMP[5]
$\mu E\ cm^{-2}\ day$		$mg\ dm^{-2}\ day^{-1}$		$mg\ cm^{-2}$
0	(0)[1]	182	-85	0.65
1814	(200)	366	-138	1.52
3628	(400)	512	-181	2.22
5442	(600)	626	-214	2.76

1. Intercepted light in ly day^{-1}
2. GP = 415- 434 exp(-.000276 IPAR)
3. GP = 1047 - 865 exp(-.000132 IPAR)
4. Resp = N Resp + DResp
5. DMP = .0067 (GP + DResp + NResp) = .0067 (GP + Resp)

Table 3. Predicted gross photosynthesis (GP), daytime respiration (DResp), nighttime respiration (NResp), and net photosynthesis (NCE) in units of mg CO_2 dm^{-2} day^{-1} and dry matter accumulation (DM) in units of mg cm^{-2} for Plainsman V from emergence (1) to jointing (2), from jointing to heading (3), and from heading to soft ripe (4), and number of days for each stage summarized.

	GROWTH STAGE			
	1-2	2-3	3-4	TOTAL
Days	189	35	36	260
GP	18572	17706	10629	46,907
DResp	-3743	-3710	-2250	-9,703
NResp	-5934	-4151	-2149	-12,234
NCE	8895	9845	6230	24,970
DM	59.6	66.0	41.7	167.3

respired, which is less than estimated by Biscoe et al. (1975b) and Connor (1975) of 48.6% and 55%, respectively.

Photosynthetic efficiency values, in terms of total solar radiation (SR in ly/day), were calculated for Plainsman V using the heat of combustion of plant material as 4 Kcal/gm suggested by Leith (1968) as an appropriate average for herbaceous plants. For Plainsman V, values were 0.46%, 1.61%, and 0.79% respectively from emergence to jointing, jointing to heading, and heading to soft ripe. From data of Biscoe et al. (1975b) values for spring barley were 1.55% for the six weeks before anthesis and 1.00% from anthesis to soft ripe. All values were considerably below the estimate by Loomis and Williams (1963) of 5-6% for maximum possible efficiency.

The 24-hour NCE or TNCE can be obtained from equations [6], [12], and [13] which require measuring solar radiation, maximum temperature, minimum temperature, and leaf area index,

$$\text{TNCE} = \text{GP} + \text{DResp} + \text{NResp}. \qquad [14]$$

From TNCE estimates, daily dry-matter production (DMP) can be calculated using the conversion by Kvet et al. (1971)

$$\text{DMP} = .0067\ \text{TNCE} \qquad [15]$$

where DMP is in mg cm^{-2}. By summing the DMP for each day, the cumulative value can be compared with total dry matter observed in the field.

Tests

To compare the values predicted by the model with measured above-ground dry matter, we made several assumptions about root dry-matter production. Root dry weights were taken in the 1974-75 season on Centurk (Kanemasu et al. 1977)[4]. Rooting densities of 11, 18, and 25 mg cm^{-2} were obtained for dormancy, jointing and heading, respectively. Pasternak (1974), Cox and Wright (1975), and Connor (1975) found rooting densities of 23, 22, and 21 mg cm^{-2}, respectively, at maturity. Those root values, added to the above-ground dry weights, were compared with those of model for Riley county fields. Because seeding rates were lower in western than in eastern Kansas, we arbitrarily used 3/4 and 1/2 of root weights for Ellsworth and Finney counties, respectively. Fortunately, an error in estimating root weights did not result in large errors in total dry matter, especially late in the growing season.

Shown in Fig. 2 are the model-predicted dry matter and observed dry matter for all fields in which data were not used in developing the model. In general, the values lie along the 1:1 line.

Shown in Figs. 3, 4, and 5 are the temporal trends in observed and predicted dry matter and leaf-area index. Shown in Fig. 3 are predicted and observed dry matter for Evapotranspiration Research fields. Predicted and observed dry matter agreed closely until heading (1 May), when the equations began to underestimate dry-matter accumulation. The NCE measurements also decreased after heading as LAI decreased. That discrepancy which did not occur on the commercial fields studied (Figures 2, 4, 5), might have resulted from errors (1) in sampling dry matter; (2) in measuring NCE after jointing; (3) errors associated with photosynthesis by yellowing leaves (not included in LAI measurements); or (4) in estimating respiration after heading. After a severe frost (3 May), the chambers might have been moved to locations with greater head damage than the dry-matter samples.

No NCE measurements were made during December, January, or February,

4/ Kanemasu, E. T., J. L. Heilman, J. Bagley, and W. L. Powers. 1977. Using Landsat data for estimating evapotranspiration of winter wheat. Env. Mgt. (submitted).

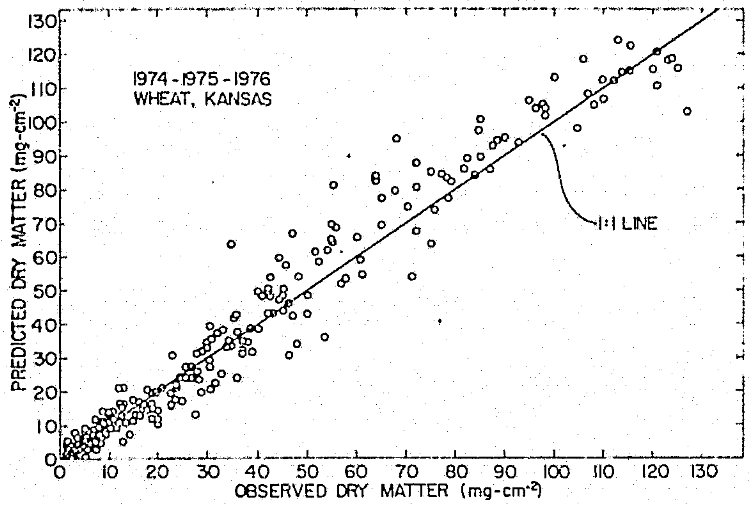

Figure 2. Observed versus predicted dry-matter accumulation for 20 fields.

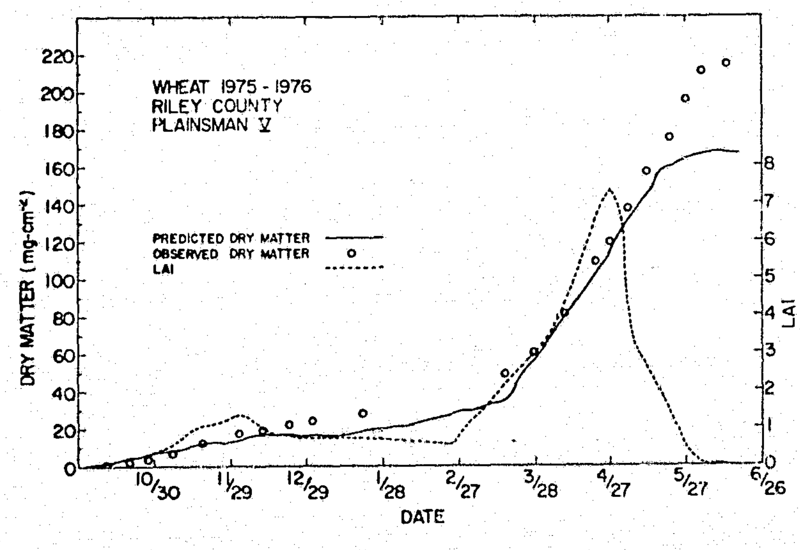

Figure 3. Seasonal trends in observed and predicted dry-matter accumulation and LAI for Evapotranspiration Research fields (1975-1976).

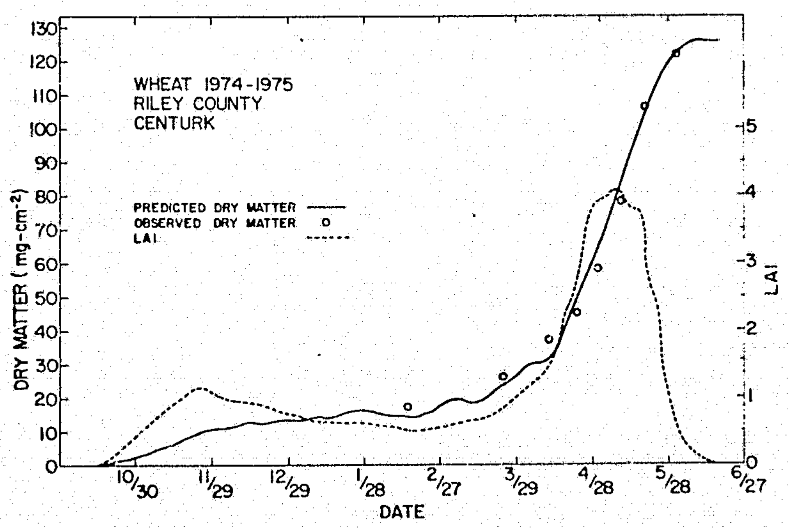

Figure 4. Seasonal trends in observed and predicted dry matter accumulation and LAI for a Riley county field (1974-1975).

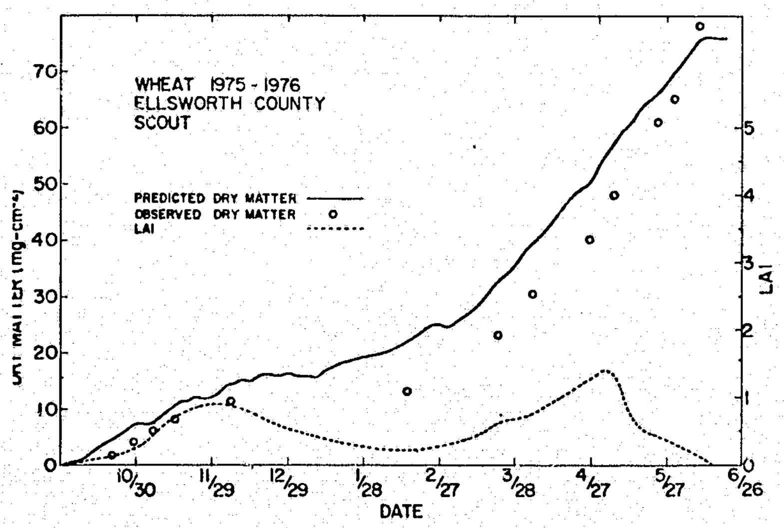

Figure 5. Seasonal trends in observed and predicted dry matter accumulation and LAI for an Ellsworth county field (1975-76).

hence, we could not evaluate directly the assumption that photosynthesis ceases when the maximum temperature is less than 5 C. However, the predicted dry matter at the end of February was not greatly different from the observed dry matter (Figs. 2, 3, 4, 5). Repka and Kubova (1971) reported that roots and shoots of wheat respond rapidly to temporary increases in temperature.

We could not adequately test the assumption that GP decreases linearly with available soil moisture after a threshhold value because water deficits did not occur until the ripening period. At that time, GP was also declining because of leaf senescence.

CONCLUSIONS

The maintenance coefficient of wheat presented here was less sensitive to temperature than were coefficients found for sorghum and white clover (McCree, 1974), possibly because wheat is a cool-season grass. Photosynthesis was found to increase sharply after jointing possibly because of increased sink capacity. On most wheat fields studied, predicted and observed dry matter agreed for most of the growing season. Assuming that photosynthesis ceased when the maximum temperature was less than 5 C gave reasonable estimates of dry-matter accumulation during the winter.

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APPENDIX D

COMPUTER PROGRAM FOR ET MODEL

```
      COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                         SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
C          KSU MODEL 6: SOIL EVAPORATION MODEL.
C
C          INPUT CARDS.
C
C          1.   TITLE CARD.  APPEARS AT THE TOP OF EACH
C               OUTPUT PAGE.  80 COLUMNS OF INFORMATION.
C
C          2.   CROP DATA.  DATE SPECIFIED AS OCT 4, 1974 IN FIELD OF 32,
C               LOCATION, IN FIELD OF 32. (2 SEPARATE CARDS). (4A4).
C
C          3.   VARIABLE FORMAT.  SPECIFIES FORMAT OF INPUT
C               FOR MODEL.
C
C          4.   PARAMETERS FOR RUN.
C               MXH2O, TV, TIN, T5, U, ALPHA, CNST, X5, FLOCP, MULT
C
C          5.   THE MONTH DAY AND YEAR OF START OF DATA.
C               SPECIFIED AS 02/14/75.  (I2,1X,I2,1X,I2)
C
C          6.   THE LAST MONTH OF DATA SPECIFIED.  I2.
C
C          7.   CFLAG FOR SORGHUM=1; SOYBEAN=2; WHEAT=3; CORN=4. (I2).
C
C          8.   THETA  VALUES FOR EACH LAYER.  THETA MAX VALUES FOR EACH
C               LAYER.  THETA MIN VALUES FOR EACH LAYER. (15F5.0)
C
C          9.   CHECK FOR ADDITIONAL OUTPUT. 1 IF NO. 2 IF YES. I2
C
C          10.  CHECK FOR BMTS SUBROUTINE.  01 IF NO, 02 IF YES.
C               CHECK FOR IRRIGATION.  00 IF NO. TOT. IRR. DAYS IF YES.
C               (I2,1X,I2)
C
C          11.  COEFFICIENTS USED IN BIO METERLOGICAL TIME SCALE
C               (SUBROUTINE (CLOCKER)).  6 CARDS.  FOR WHEAT ONLY.
C
C          12.  THE MONTH AND DAY OF PLANTING.  FOR WHEAT ONLY. (I2,1X,
C               I2)
C
C          13.  MONTH,DAY,YEAR,AND AMOUNT OF IRRIGATION FOR EACH IRR.
C               DAY. E.G. 0510774.40  FORMAT 8(3I2,F4.2).
C               LAST ENTRY MUST BE 0000000.00
C
C
C          14.  CORN GROWTH PARAMETERS (5 CARDS, ONE CARD FOR EACH STAGE RANGE)
C               0 IN COLUMN 1 INDICATES USE OF PRE-SET GDD VALUES
C               1 INDICATES USE OF INPUT DATES OFR GROWTH STAGE DIFFERENTIATION
C               IF 1 IS USED, THE MONTH AND DAY MUST APPEAR AS 2I2 IN COLUMNS 5-8
C
C
C          15.  THE MONTH AND DAY OF PLANTING.  FOR CORN ONLY.  (I2,1X,I2)
C
C
C          16.  DATA CARDS: DAILY SR,MAXT,MINT,LAI,RAIN,DL
C               SHOULD CORRESPOND TO VARIABLE FORMAT #3 ABOVE.
C               DL FOR WHEAT ONLY.
C
```

```
              C
              C              DECLARATION OF VARIABLES
              C
ISN 0002           REAL MXRZC,MAXT,MINT,LAI,THEVAL(5),TVAL(5),ZVAL(5)/50.,250.,
                  *2*300.,900./,CVAL(5),THEMAX(5),THEMIN(5),KVAL2(5)/.05,.25,.25,
                  *.25,.2/,KVAL1(5)/.1,.5,.4,2*0./,THETT,TAU,PNS,THCT,THDF,THAT,
                  *THIF,THAF,THIT,RAINOL,RAINEW,TACC,MULT,TDAY,TX,TN,DL,TGDD,
                  *TEOA(13),EOA(13,13),TRSE(7,13),EOR,MFLOCP,KS,T,ET,FLOCP,T2,CV,
                  *TREOA(13),PTACC1
ISN 0003           REAL LB(7)/'PT -','EM -','JT -','BT -','HD -','SD -','RP->'/,
                  *UB(7)/'EM','JT','BT','HD','SD','RP','  '/,T3
ISN 0004           REAL KAY(6)/1.0,2.0,2.7,3.0,4.0,5.0/,DIFF
ISN 0005           INTEGER SYR(6),SMO(6),SDAY(6),SCLK(6),CLOCK,BIFLG,ICOUNT,RFLG,YEAR
ISN 0006           INTEGER DAY,YR,SCYSGP,CAL(12)/31,28,31,30,31,30,31,31,30,31,30,31
                  */,TITLE(20),FLAG, DISC /11/,CO(5)/5*0/,DAYT,PLANT(8),LOC(10),
                  *K,PDAY,PMC,BMT,BFLAG,CTR,J,BPS,DT,N
ISN 0007           INTEGER IMC(30),IDAY(30),IYR(30),IRRCHK,II
ISN 0008           REAL IRR(30),FALLRT
ISN 0009           DIMENSION COEF(6,8)
ISN 0010           REAL*8 FRMT(10)
ISN 0011           INTEGER OPTN(5),GDDMC(5),GDDCAY(5),GDDBGN,STAGE
ISN 0012           REAL    GDDVAL(5)/562.,1195.,1420.,1690.,2481./
ISN 0013           REAL TCCRN(6,6),STCORN(6)
ISN 0014           REAL*8 COFNB(6)/'0 - 2   ','2 - 4   ','4 - 5   ','5 - 6   ',
                  *    '6 -10   ','10->    '/
              C
              C              INITIALIZE
              C
ISN 0015           II=1
ISN 0016           CRAIN=0.0
ISN 0017           RAINOL=0.0
ISN 0018           RUNOFF=0.0
ISN 0019           EST=0.0
ISN 0020           ET=0.0
ISN 0021           COUNT=2.0
ISN 0022           DAYT=0
ISN 0023           TACC=0.0
ISN 0024           K=1.
ISN 0025           KS=1.0
ISN 0026           BMT=0.0
ISN 0027           CTR=1.
ISN 0028           TGDD=0.0
ISN 0029           BPS=1
ISN 0030           T2=0.0
ISN 0031           TAU=0.0
ISN 0032           CV=3.0
ISN 0033           DT=60.
ISN 0034           PTACC1=0.0
ISN 0035           ETFLG=0
ISN 0036           RFLG=0
ISN 0037           CLOCK=0
ISN 0038           ICOUNT=0
ISN 0039           DO 218 J=1,6
ISN 0040            SYR(J)=0
ISN 0041            SMO(J)=0
ISN 0042            SDAY(J)=0
ISN 0043            SCLK(J)=0
ISN 0044       218 CONTINUE
```

```
ISN 0045          DO 200 J=1,7
ISN 0046          DO 202 M=1,13
ISN 0047      202 TPSE(J,M)=0.0
ISN 0048      200 CONTINUE
ISN 0049          DO 203 J=1,13
ISN 0050          DO 204 M=1,13
ISN 0051      204 EPA(J,M)=0.0
ISN 0052      203 CONTINUE
ISN 0053          DO 205 J=1,13
ISN 0054      205 TEOA(J)=0.0
ISN 0055          DO 217 J=1,13
ISN 0056      217 TBEOA(J)=0.0
ISN 0057          DO 219 J=1,6
ISN 0058          STCORN(J)=0.0
ISN 0059          DO 219 M=1,6
ISN 0060      219 TCORN(J,M)=0.0
ISN 0061          STAGE=1
ISN 0062          GDDBGN=0
            C
            C              READ IN INPUT
            C              OUTPUT HEADINGS
            C
ISN 0063          READ (5,100,END=999) TITLE
ISN 0064          READ(5,100) PLANT
ISN 0065          READ(5,100) LOC
ISN 0066          READ(5,101)FRMT
ISN 0067          READ (5,102) MXH2O,TV,TIN,TS,U,ALPHA,FALLRT,CNST,XS,FLDCP,MULT
ISN 0068          MFLDCP=FLDCP*1500
ISN 0069          WRITE (6,103)TITLE
ISN 0070          WRITE (6,104)MXH2O,TV,TIN,TS,U,ALPHA,FALLRT,CNST,XS,MFLDCP,MULT
ISN 0071          WRITE(6,105)PLANT
ISN 0072          WRITE(6,106) LOC
ISN 0073          TI=TIN
ISN 0074          READ (5,107) MO,DAY,YR
ISN 0075          KDAY=DAY
ISN 0076          READ (5,107) KMO
ISN 0077          IF(KMO.LT.MO)KMO=KMO+12
ISN 0079          KMO=MO
ISN 0080          YEAR=YR
ISN 0081          READ(5,107)SOYSOR
ISN 0082          ALPHAV=1.44
ISN 0083          GO TO (301,302,303,304),SOYSOR
ISN 0084      302 ALPHAV=1.71
ISN 0085          GO TO 301
ISN 0086      303 ALPHAV=1.56
ISN 0087          CV=1.35
ISN 0088          DT=189.
ISN 0089          GO TO 301
ISN 0090      304 ALPHAV=1.74
ISN 0091      301 READ(5,108) THEVAL,THEMAX,THEMIN
ISN 0092          READ (5,107) LAYCHK
ISN 0093          READ(5,107) BFLAG,IRRCHK
ISN 0094          IF (BFLAG-2) 305,306,305
ISN 0095      306 READ(5,109) ((COEF(I,J),J=1,8),I=1,6)
ISN 0096          READ (5,107) PMO,PDAY
ISN 0097      305 IF(IRRCHK.EQ.0) GO TO 359
ISN 0099          READ(5,115)(IMO(I),IDAY(I),IYR(I),IRR(I),I=1,IRRCHK)
ISN 0100      359 FLAG=0
```

```
ISN 0101            IF(SOYSOR.NE.4) GO TO 360
ISN 0103            READ(5,121) (CPTN(J),GDDMO(J),GDDDAY(J),J=1,5)
ISN 0104            READ(5,107) PMO,PDAY
ISN 0105        360 IF(T5.GE.X5) FLAG=1
              C
              C              TOP OF LOOP OF ANALYSIS.
              C
ISN 0107            DO 206 MMM=MC,KMO
ISN 0108            WRITE (6,103)TITLE
ISN 0109            WRITE (6,110)
ISN 0110            LIM=CAL(MMC)
ISN 0111            IF(MMO.EQ.2.AND.MOD((YR+1),4).EQ.0) LIM=29
ISN 0113            DO 207 JJJ=DAY,LIM
ISN 0114            IF(MMO.EQ.1.AND.JJJ.EQ.1) YEAR=YR+1
              C
ISN 0116            GO TO (307,308),BFLAG
ISN 0117        308 READ(5,FRMT,END=332) SR,MAXT,MINT,LAI,RAIN,DL
ISN 0118            GO TO 309
ISN 0119        307 READ(5,FRMT,END=332) SR,MAXT,MINT,LAI,RAIN
ISN 0120        309 COVER=LAI/CV
ISN 0121            IF(COVER.GT.0.0) DAYT=DAYT+1
ISN 0123            IF(COVER.GT.1.0) COVER=1.00
ISN 0125            IF (DAYT-DT) 333,333,310
ISN 0126        310 IF(COVER.LT..4) COVER=.4
              C
              C              IF TEMPURATURE IS IN DEGREES F,
              C              PLACE CONVERSIONS T=(T-32.0)*5./9. FOR
              C              MIN AND MAX HERE.
              C
ISN 0128        333 MAXT=(MAXT-32.0)*5./9.
ISN 0129            MINT=(MINT-32.0)*5./9.
              C
              C
              C              CHECK FOR IRRIGATION
              C
ISN 0130            IF(IRRCHK.EQ.0) GO TO 361
ISN 0132            IF((IMO(II).EQ.MMO.AND.IDAY(II).EQ.JJJ).AND.IYR(II).EQ.YEAR)
                   *GO TO 363
ISN 0134            GO TO 361
ISN 0135        363 RAIN=RAIN+IRR(II)
ISN 0136            II=II+1
ISN 0137        361 RAIN=RAIN*10.0
ISN 0138            RAINEW=RAIN+RAINOL
ISN 0139            RAINOL=RAIN
ISN 0140            IF (RAINEW.LT.6.0) GO TO 311
ISN 0142            FLAG=0
ISN 0143            EST=0.0
ISN 0144            COUNT=2.0
ISN 0145        311 TMP=(3*MAXT+MINT)/4.0
ISN 0146            SSD=DELTA(TMP)
ISN 0147            GO TO (314,312,313,314),SOYSOR
              C
              C              CALCULATION FOR GROWING DEGREE DAYS (GDD)
              C              FOR CORN ONLY
              C
ISN 0148        314 FMAXT=MAXT
ISN 0149            FMINT=MINT
ISN 0150            FMAXT=((9./5.)*FMAXT)+32.
```

```
ISN 0151          FMINT=((9./5.)*FMINT)+32.
ISN 0152          IF (FMAXT.GT.86.) FMAXT=86.
ISN 0154          IF (FMINT.LT.50.) FMINT=50.
ISN 0156          GDD=(FMAXT/2.+FMINT/2.)-50.
ISN 0157          TGDD=TGDD+GDD
ISN 0158          IF(SOYSCR.NE.4) GO TO 312
ISN 0160          IF(MMO.EQ.PMO.AND.JJJ.EQ.PDAY) GDDBGN=1
ISN 0162          IF(STAGE.GT.5) GO TO 312
ISN 0164          IF(GDDBGN-1) 312,362,312
ISN 0165      362 CALL CTIMER(TGDD,OPTN,GDDMO,GDDDAY,STAGE,JJJ,MMO,GDDVAL)
ISN 0166          GO TO 312
ISN 0167      313 GO TO (312,315),BFLAG
ISN 0168      315 IF (MMO.EQ.PMO.AND.JJJ.EQ.PDAY) BMT=1
ISN 0170          IF (BMT-1) 312,316,312
            C
            C            FOR WHEAT ONLY
            C
ISN 0171      316 TX=MAXT
ISN 0172          TN=MINT
            C     .....
            C            CALL BIO METEROLOGICAL TIME SCALE SUBROUTINE
            C
ISN 0173          CALL CLCKER (COEF,TN,TX,CL,TDAY,K,MULT,TACC,CLOCK,MMO,JJJ,YEAR,
                 *        BTFLG,DIFF,SYR,SMO,SDAY,SCLK,ICOUNT,RFLG,KAY,
                 *        PTACC1)
            C
            C     .....
            C
            C     .....
            C            CALL OF SUBROUTINE TO CALCULATE POT EVAP.
            C
ISN 0174      312 CALL POTEVA(LAI,SOYSCR,RN,SR,ALPHA,SSD,EO,DAYT)
            C     .....
            C
ISN 0175          TI=TI-ET+RAIN
ISN 0176          IF(TI.GE.MFLDCP) TI=MFLDCP
            C
            C            IF POT EVAP IS . ZERO ALL EVAP ARE ZERO
            C
ISN 0178          IF (EO.GT.0.0) GO TO 317
ISN 0180          EO=0.0
ISN 0181          ES=0.0
ISN 0182          T =0.0
ISN 0183          T2=0.0
ISN 0184          GO TO 318
            C     .....
            C            CALL TRANSPIRATION SUBROUTINE
            C
ISN 0185      317 CALL TRANS(TI,MXH2O,TV,KS,LAI,T,ALPHA,RN,SSD,COVEP,TAU,ALPHAV,
                 *DRY,SOYSCR,T2,TGDD,TACC,FALLRT)
            C     .....
            C
            C     .....
            C            CALL SOIL EVAPORATION SUBROUTINE.
            C
ISN 0186          CALL EVAP(FLAG,LAI,RN,EST,ES,U,CNST,COUNT,SSD,DRY,COVER,DAYT,TAU,
                 *SOYSCR)
            C     .....
```

```
ISN 0187            RNS=TAU*RN
               C
               C              CALCULATION OF % EVAPORATION
               C
ISN 0188            GO TO (319,320,321,319),SOYSOR
               C
               C                     FOR SOYBEAN
               C
ISN 0189        320 IF (MAXT-31.) 322,318,318
               C
               C                     FOR WHEAT
               C
ISN 0190        321 IF (MAXT-27.) 322,323,323
               C
               C                     FOR SORGHUM OR CORN
               C
ISN 0191        319 IF(KS.LT.1.0.OR.MAXT.LT.33.0) GO TO 322
ISN 0193            GO TO 323
ISN 0194        322 A=0.0
ISN 0195            GO TO 324
ISN 0196        318 A=.25*T
ISN 0197            GO TO 324
ISN 0198        323 A=.1*T
ISN 0199        324 IF(MAXT.GE.-3.0) GO TO 325
ISN 0201            ES=0.0
ISN 0202            T=0.0
ISN 0203            A=0.0
               C
               C             CALCULATION OF TRANSPIRATION, PCT.EVAP RATIO
               C
ISN 0204        325 IF(KS.LT.1.0) A=0.0
ISN 0206            T2=T2+A
ISN 0207            ET=ES+T+A
ISN 0208            IF (EO.EQ.0.0) GO TO 326
ISN 0210            EOR=(T+A)/EO
ISN 0211            GO TO 327
ISN 0212        326 EOR=0.0
ISN 0213        327 IF(RFLAG.EQ.2.AND.BMT.EQ.1) GO TO 355
ISN 0215            IF(SOYSOR.EQ.4.AND.GDDBGN.EQ.1) GO TO 356
ISN 0217            GO TO 329
               C
               C             CUMMALATIVE SUMS ON BMTS BASIS
               C
ISN 0218        355 BMS=K
ISN 0219            IF(RFLG.EQ.1) BMS=BMS+1
ISN 0221            TBSE(BMS,1)=TBSE(BMS,1)+EO
ISN 0222            TBSE(BMS,2)=TBSE(BMS,2)+ES
ISN 0223            TBSE(BMS,3)=TBSE(BMS,3)+T
ISN 0224            TBSE(BMS,4)=TBSE(BMS,4)+A
ISN 0225            TBSE(BMS,5)=TBSE(BMS,5)+ET
ISN 0226            TBSE(BMS,6)=TBSE(BMS,6)+RAIN
ISN 0227            TBSE(BMS,7)=TBSE(BMS,7)+EOR
ISN 0228            GO TO 329
               C             CUMMULATIVE SUMS ON GDD BASIS
ISN 0229        356 TCORN(STAGE,1)=TCORN(STAGE,1)+EO
ISN 0230            TCORN(STAGE,2)=TCORN(STAGE,2)+ET
ISN 0231            TCORN(STAGE,5)=TCORN(STAGE,5)+RAIN
               C
```

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                 C              CUMMALATIVE SUMS ON MONTHLY BASIS
                 C
ISN 0232           329 EOA(CTR,1)=EOA(CTR,1)+EO
ISN 0233               EOA(CTR,2)=EOA(CTR,2)+ES
ISN 0234               EOA(CTR,3)=EOA(CTR,3)+T
ISN 0235               EOA(CTR,4)=EOA(CTR,4)+A
ISN 0236               EOA(CTR,5)=EOA(CTR,5)+ET
ISN 0237               EOA(CTR,6)=EOA(CTR,6)+RAIN
ISN 0238               EOA(CTR,7)=EOA(CTR,7)+EOR
                 C
                 C              OUTPUT LINE
                 C
ISN 0239               WRITE (6,111)MMO,JJJ,MAXT,MINT,TAU,RNS,SR,RN,LAI,COVER,RAIN,EO,ES,
                      *T,A,ET,TI,KS,TACC,TGDD
ISN 0240               WRITE (DISC) ES,T2,RAIN,LAI,EO
ISN 0241           207 CONTINUE
ISN 0242               MMO=MMO+1
ISN 0243               IF(MMO.GT.12) MMO=MMO-12
ISN 0245               DAY=1
                 C
                 C              OUTPUT AND INITIALIZE AT END OF MONTH
                 C
ISN 0246               WRITE(6,112) EOA(CTR,6),(EOA(CTR,M),M=1,5)
ISN 0247               CTR=CTR+1
ISN 0248           206 CONTINUE
ISN 0249               GO TO 331
                 C
                 C              FOR END IN MID MONTH
                 C
ISN 0250           332 WRITE(6,112) EOA(CTR,6),(EOA(CTR,M),M=1,5)
ISN 0251           331 ENDFILE DISC
ISN 0252               IF (LAYCHK.EQ.1) GO TO 500
ISN 0254               REWIND DISC
ISN 0255               DO 208 I=1,5
ISN 0256           208 CVAL(I)=(THEMAX(I)*.3)+(THEMIN(I)*.7)
                 C
                 C              LOOP TO CALCULATE LAYER CONTENTS.
                 C
ISN 0257               CTR=1.
ISN 0258               RNS=1.
ISN 0259               MMO=MO
ISN 0260               THAT=0
ISN 0261               THIT=0
ISN 0262               THAF=0
ISN 0263               THIF=0
ISN 0264               THOT=0
ISN 0265               THOF=0
ISN 0266               THETI=TIN
ISN 0267               STAGE=1
ISN 0268               CDOPGN=0
ISN 0269               DO 209 I=1,4
ISN 0270           209 THAT=THEMAX(I)*ZVAL(I)+THAT
ISN 0271               DO 210 I=1,4
ISN 0272           210 THIT=THEMIN(I)*ZVAL(I)+THIT
ISN 0273               THAF=(THEMAX(5)*600)+THAT
ISN 0274               THIF=(THEMIN(5)*600)+THIT
ISN 0275               DO 211 MMM=MO,KMO
ISN 0276               WRITE (6,103) TITLE
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ISN 0277         WRITE (6,116)
ISN 0278         LIM=CAL(MMC)
ISN 0279         IF (MMO.EQ.2.AND.MOD((YR+1),4).EQ.0) LIM=29
ISN 0281         DO 212 JJJ=KDAY,LIM
ISN 0282         IF(SOYSOR.EQ.4.AND.MMO.EQ.PMC.AND.JJJ.EQ.PDAY) GDDBGN=1
ISN 0284         IF (SOYSOR.NE.3) GO TO 400
ISN 0286         IF(BMT.EQ.1) GO TO 400
ISN 0288         IF(MMO.EQ.PMC.AND.JJJ.EQ.PDAY) BMT=1
ISN 0290     400 READ (DISC,END=407) ES,T2,RAIN,LAI,EO
ISN 0291         TAVAIL=THETT-(TV*1500)
ISN 0292         IF(SOYSOR.EQ.4) GO TO 411
ISN 0294         KS=TAVAIL/(FALLRT*MXH2O)
ISN 0295         GO TO 412
ISN 0296     411 RATIO=TAVAIL/MXH2O
ISN 0297         KS=2.16*RATIO
ISN 0298         IF(RATIO.GE..25) KS=1.32*RATIO+.21
ISN 0300         IF(RATIO.GE..50) KS=.26*RATIO+.74
ISN 0302     412 IF (KS.GT.1) KS=1
ISN 0304         IF (KS.LT.0.0) KS=0.0
ISN 0306         IF (T2.LE.0.) KS=0.0
ISN 0308         T3=T2*KS
ISN 0309         ET=T3+ES
           C     .....
ISN 0310         CALL DISTR(T3,TVAL,KVAL1,KVAL2,LAI)
           C     .....
ISN 0311         RUNOFF=0.0
ISN 0312         DRAIN=0.0
ISN 0313         CALL CAY1 (THEVAL,ZVAL,DRAIN,CD,THEMAX)
ISN 0314         IF (RAIN.EQ.0.)GO TO 401
           C     .....
ISN 0316         CALL CAYO(THEVAL,RAIN,ZVAL,RUNOFF,CD,THEMAX)
           C     .....
           C     .....
ISN 0317     401 CALL MOIST (THEVAL,ES,TVAL,ZVAL,THEMIN)
           C     .....
ISN 0318         THETT=THEVAL(1)*50
ISN 0319         THETT=(THEVAL(2)*250)+THETT
ISN 0320         THETT=(THEVAL(3)*300)+THETT
ISN 0321         THETT=(THEVAL(4)*300)+THETT
ISN 0322         THOT=(THAT-THETT)/(THAT-THII)*100
ISN 0323         THETT=(THEVAL(5)*600)+THETT
ISN 0324         THDF=(THAF-THETT)/(THAF-THIF)*100
ISN 0325         IF (THOT.GT.100.0) THOT=100.0
ISN 0327         IF (THDF.GT.100.0) THDF=100.0
ISN 0329         IF(SOYSOR.EQ.4.AND.MMO.EQ.FMO.AND.JJJ.EQ.PDAY) TCORN(1,6)=THDF
ISN 0331         IF (EO.NE.0.0) GO TO 402
ISN 0333         TEO=0.0
ISN 0334         ETEO=0.0
ISN 0335         GO TO 403
ISN 0336     402 TEO=T3/EO
ISN 0337         ETEO=ET/EO
ISN 0338     403 IF(BFLAG.EQ.2.AND.BMT.EQ.1) GO TO 404
ISN 0340         IF(SOYSOR.EQ.4.AND.GDDBGN.EQ.1) GO TO 408
ISN 0342         GO TO 405
ISN 0343     404 IF(BMS.EQ.7) GO TO 406
ISN 0345         IF(JJJ.EQ.SDAY(BMS).AND.MMC.EQ.SMO(BMS)) BMS=BMS+1
ISN 0347     406 TBSE(BMS,8)=TBSE(BMS,8)+T3
ISN 0348         TBSE(BMS,9)=TBSE(BMS,9)+ET
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ISN 0349          TBSE(BMS,10)=TBSE(BMS,10)+TEO
ISN 0350          TBSE(BMS,11)=TBSE(BMS,11)+ETEO
ISN 0351          TBSE(BMS,12)=TBSE(BMS,12)+KS
ISN 0352          TBSE(BMS,13)=TBSE(BMS,13)+T2
ISN 0353          GO TO 405
ISN 0354      408 IF(STAGE.GT.5) GO TO 410
ISN 0356          IF(GODMO(STAGE).EQ.MMO.AND.GODDAY(STAGE).EQ.JJJ) GO TO 409
ISN 0358          GO TO 410
ISN 0359      409 STAGE=STAGE+1
ISN 0360          TCORN(STAGE,6)=THDF
ISN 0361      410 TCORN(STAGE,4)=TCORN(STAGE,4)+TEO
ISN 0362          TCORN(STAGE,3)=TCORN(STAGE,3)+T3
             C
             C                 OUTPUT LINE
             C
ISN 0363      405 WRITE(6,113) MMO,JJJ,THEVAL,TVAL,RUNOFF,DRAIN,THETT,T3,ET,KS,
                 *THDT,THDF
ISN 0364          EOA(CTR,8)=EOA(CTR,8)+T3
ISN 0365          EOA(CTR,9)=EOA(CTR,9)+ET
ISN 0366          EOA(CTR,10)=EOA(CTR,10)+TEO
ISN 0367          EOA(CTR,11)=EOA(CTR,11)+ETEO
ISN 0368          EOA(CTR,12)=EOA(CTR,12)+RUNOFF
ISN 0369          EOA(CTR,13)=EOA(CTR,13)+DRAIN
ISN 0370      212 CONTINUE
ISN 0371          WRITE(6,114) EOA(CTR,12),EOA(CTR,13),EOA(CTR,8),EOA(CTR,9)
ISN 0372          CTR=CTR+1.
ISN 0373          MMO=MMO+1
ISN 0374          IF(MMO.GT.12) MMO=MMO-12
ISN 0376          KDAY=1
ISN 0377      211 CONTINUE
ISN 0378          GO TO 500
ISN 0379      407 WRITE(6,114) EOA(CTR,12),EOA(CTR,13),EOA(CTR,8),EOA(CTR,9)
             C
             C                 SUMMARY PAGE
             C
ISN 0380      500 WRITE (6,103) TITLE
ISN 0381          WRITE (6,117)
ISN 0382          CTR=1.
ISN 0383          MMO=MO
ISN 0384          DO 213 MMM=MO,KMO
ISN 0385          WRITE(6,118) MMO,(EOA(CTR,M),M=1,13)
ISN 0386          DO 214 J=1,13
ISN 0387      214 TEOA(J)=TEOA(J)+EOA(CTR,J)
ISN 0388          CTR=CTR+1
ISN 0389          MMO=MMO+1
ISN 0390          IF (MMO.GT.12) MMO=MMO-12
ISN 0392      213 CONTINUE
ISN 0393          WRITE(6,119) (TEOA(M),M=1,13)
ISN 0394          IF(SOYSOR.EQ.4) GO TO 502
ISN 0396          IF (BFLAG-2) 999,501,999
ISN 0397      501 WRITE (6,120)
ISN 0398          DO 215 J=1,BMS
ISN 0399          WRITE(6,123) LB(J),UB(J),(TBSE(J,M),M=1,13)
ISN 0400          DO 216 N=1,13
ISN 0401          TBEOA(N)=TBEOA(N)+TBSE(J,N)
ISN 0402      216 CONTINUE
ISN 0403      215 CONTINUE
ISN 0404          WRITE(6,122) (TBEOA(N),N=1,13)
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ISN 0405          WRITE(6,127)  (KAY(J),SCLK(J),SMO(J),SDAY(J),SYR(J) ,J=1,K)
ISN 0406          GO TO 999
ISN 0407      502 WRITE(6,128)
ISN 0408          DO 503 J=1,STAGE
ISN 0409          WRITE(6,129) CORNB(J),(TCORN(J,K),K=1,6)
ISN 0410          DO 504 K=1,5
ISN 0411          STCORN(K)=STCORN(K)+TCORN(J,K)
ISN 0412      504 CONTINUE
ISN 0413      503 CONTINUE
ISN 0414          WRITE(6,131) (STCORN(K),K=1,5)
ISN 0415          IF(STAGE.GT.5) STAGE=5
ISN 0417          WRITE(6,130) (GDDMO(J),GDDDAY(J),YR,GDDVAL(J),J=1,STAGE)
            C
            C                  INPUT/OUTPUT FORMATS
            C
ISN 0418      100 FORMAT (20A4)
ISN 0419      101 FORMAT (10A8)
ISN 0420      102 FORMAT (5F10.0,6F5.0)
ISN 0421      103 FORMAT ('1',20X,20A4)
ISN 0422      104 FORMAT('0',19X,'MAXIMUM AVAILABLE WATER (MM)..................',
             *  F10.4,//,20X,'THETA SUB V (15 BAR)..........................',
             *  F10.4,//,20X,'THETA INITIAL IN 5 FT. PROFILE (MM)...........',
             *  F10.4,//,20X,'THETA SUB 5 CM. LAYER.........................',
             *  F10.4,//,20X,'U (MM)........................................',
             *  F10.4,//,20X,'ALPHA (P-T)...................................',
             *  F10.4,//,20X,'FALLRT........................................',
             *  F10.4,//,20X,'SOIL CONSTANT (MM DAY TO -1/2)................',
             *  F10.4,//,20X,'X SUB 5 (INIT.WATER CONTENT IN 5 CM. LAYER,WT..',
             *  F10.4,//,20X,'FIELD CAPACITY................................',
             *  F10.4,//,20X,'BMTS MULTIPLIER...............................',
             *  F10.4)
ISN 0423      105 FORMAT('0',19X,'PLANTING DATE.................................',
             *'..',20A4)
ISN 0424      106 FORMAT('0',19X,'FIELD/LOCATION................................',
             *'..',20A4)
ISN 0425      107 FORMAT (I2,1X,I2,1X,I2)
ISN 0426      108 FORMAT (15F5.0)
ISN 0427      109 FORMAT (8E10.4)
ISN 0428      110 FORMAT (/////////,9X,'MAX   MIN   TAU   RNS    SOLAR   NET   ',
             *'LEAF',16X,'PCT.    SOIL    TRAN      A     TOTAL',11X,'KS',/,
             *' MO  DAY TEMP  TEMP',8X,'RAD.    RAD    RAD   AREA COVER  ',
             *'RAIN    EVAP    EVAP    EVAP    EVAP    EVAP   THETA',6X,
             *3X,'BMTS    GDD',/,9X,'(C)   (C)',8X,'(LYS)   (LYS)   (LYS)       ',
             *8X,'(MM)    ','(MM)    (MM)    (MM)    (MM)    (MM)   (MM)',/)
ISN 0429      111 FORMAT (' ',I2,I4,F6.1,F6.1,F6.2,F7.2,F7.1,F7.1,F6.2,F6.2,F7.2,
             *5F8.3,F8.2,F6.2,2X,F4.2,F7.1)
ISN 0430      112 FORMAT ('OTOTALS',51X,F7.2,5F8.3)
ISN 0431      113 FORMAT(1X,I2,I3,5F6.3,1X,5F6.3,2F7.2,F8.2,2F7.2,F6.2,F6.1,F7.1)
ISN 0432      114 FORMAT('OTOTALS',60X,2F7.1,8X,2F7.1)
ISN 0433      115 FORMAT(8(3I2,F4.2))
ISN 0434      116 FORMAT(/////,16X,'THETA VALUES',19X,'TRANSPIRATION',//,
             *' MO DY',5(1X,'LAYER'),1X,5(1X,'LAYER'),'  RNCEF',
             *'  DRAIN  THETA   TRANS  TOT.   KS    DEPL.  DEPL.',/,
             *9X,2('1',5X,'2',5X,'3',5X,'4',5X,'5',6X),20X,
             *'EVAP    EVAP',//,6X,2('  0-5   5-30 30-60 60-90 90-180'),15X,
             *'0-150',23X,'0-90   0-150',/,
             *7X,2('  CM    CM    CM    CM    CM   '),
             *' (MM)   (MM)   CM      (MM)    (MM)',9X,'CM      CM',/)
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ISN 0435      117 FORMAT(/////////,11X,'POT.     SOIL    TRAN      A   TOTAL    RAIN',
                *'  RATIO       TRAN        TOT.      RATIO        RATIO',/,
                *'  MONTH      EVAP    EVAP    EVAP    EVAP    EVAP    (MM)',
                *'    T/EO     EVAP(2)    EVAP(2)  T3/EO(2)   ET/EO(2)      RUNOFF  DRAIN
                *AGE',/)
ISN 0436      118 FORMAT(' ',I4,4X,7(F6.2,1X),6(3X,F7.2))
ISN 0437      119 FORMAT('0 TOT.  ',7F7.2,1X,6(3X,F7.2))
ISN 0438      120 FORMAT(/////,' BMTS      POT.    SOIL    TRAN      A    TOTAL    RAIN',
                *'  RATIO       TRAN        TOT.       RATIO        RATIO        RATIO',
                *'         POT',/,
                *'  MONTH      EVAP    EVAP    EVAP    EVAP    EVAP    (MM)',
                *'    T/EO     EVAP(2)    EVAP(2)  T3/EO(2)    ET/EO(2)  T3/T2(2)',
                *'  TRAN(2)',/)
ISN 0439      122 FORMAT('0 TOT.  ',7F7.2,1X,6(3X,F7.2),/)
ISN 0440      123 FORMAT(' ',A4,A2,2X,7(F6.2,1X),6(3X,F7.2))
ISN 0441      127 FORMAT(//,' EMERGENCE DATE (BMTS=',F4.2,'  DAYS=',I3,')...',I2,
                *'/',I2,'/',I2,/,' JOINTING DATE (BMTS=',F4.2,'  DAYS=',I3,')...',
                *I2,'/',I2,'/',I2,/,' BOOTING DATE (BMTS=',F4.2,'  DAYS=',I3,
                *')....',I2,'/',I2,'/',I2,/,' HEADING DATE (BMTS=',F4.2,'  DAYS=',
                *I3,')....',I2,'/',I2,'/',I2,/,' SOFT DOUGH DATE (BMTS=',F4.2,
                *'  DAYS=',I3,').',I2,'/',I2,'/',I2,/,' RIPE DATE (BMTS=',F4.2,
                *'  DAYS=',I3,').......',I2,'/',I2,'/',I2,/,'1')
ISN 0442      121 FORMAT(I2,2X,2I2)
ISN 0443      128 FORMAT(/////,'  GROWTH          POT.    TOT.    TRAN  RATIO    RAIN',
                *              ' BEGINNING',/,
                *              '    STAGE            EVAP    EVAP  EVAP2 T3/EO2    (MM)     ',
                *              'DEPL.',/)
ISN 0444      131 FORMAT('0 TOTALS',4X,5F7.2)
ISN 0445      129 FORMAT(' ',2X,A3,1X,5(1X,F6.2),3X,F5.1)
ISN 0446      130 FORMAT(//,'  STAGE  2 REACHED ON ',I2,'/',I2,'/',I2,', GDD = ',
                *        F7.1,/,
                *'   STAGE  4 REACHED ON ',I2,'/',I2,'/',I2,', GDD = ',F7.1,/,
                *'   STAGE  5 REACHED ON ',I2,'/',I2,'/',I2,', GDD = ',F7.1,/,
                *'   STAGE  6 REACHED ON ',I2,'/',I2,'/',I2,', GDD = ',F7.1,/,
                *'   STAGE 10 REACHED ON ',I2,'/',I2,'/',I2,', GDD = ',F7.1,/,'1')
ISN 0447      999 RETURN
ISN 0448          END
```

```
SYMBOL  INTERNAL STATEMENT NUMBERS
A       0194 0196 0198 0203 0204 0206 0207 0219 0224 0235 0239
I       0095 0095 0095 0099 0099 0099 0099 0099 0099 0255 0256 0256 0256 0269 0270 0270 0271 0272 0272
J       0006 0039 0040 0041 0042 0043 0045 0047 0049 0051 0053 0054 0055 0056 0057 0058 0060 0095 0095
        0095 0103 0103 0103 0103 0103 0386 0387 0387 0387 0398 0399 0399 0399 0401 0405 0405 0405 0405
        0405 0405 0405 0408 0409 0409 0411 0417 0417 0417 0417 0417
K       0006 0024 0173 0218 0405 0409 0409 0409 0410 0411 0411 0411 0414 0414 0414
M       0046 0047 0050 0051 0059 0060 0246 0246 0246 0250 0250 0250 0385 0385 0385 0393 0393 0393 0399
        0399 0399
N       0006 0400 0401 0401 0401 0404 0404 0404
T       0002 0182 0185 0196 0198 0202 0207 0210 0223 0234 0239
U       0067 0070 0186
CD      0006 0006 0313 0316
CV      0002 0032 0067 0120
DL      0002 0117 0173
DT      0006 0033 0088 0125
EC      0174 0178 0180 0208 0210 0221 0229 0232 0239 0240 0290 0331 0336 0337
ES      0181 0186 0201 0207 0222 0233 0239 0240 0290 0309 0317
ET      0002 0020 0175 0207 0225 0230 0236 0239 0309 0337 0348 0363 0365
II      0007 0015 0132 0132 0132 0135 0136 0136
KS      0002 0025 0185 0191 0204 0239 0294 0297 0298 0300 0302 0302 0304 0304 0306 0308 0351 0363
LB      0003 0003 0399
MO      0074 0077 0079 0107 0259 0275 0383 0384
RN      0174 0195 0186 0187 0239
SR      0117 0119 0174 0239
TI      0073 0175 0175 0176 0176 0185 0239
TN      0002 0172 0173
TV      0067 0070 0185 0291
TX      0002 0171 0173
T2      0002 0030 0183 0185 0206 0206 0240 0290 0306 0308 0352
T3      0003 0308 0309 0310 0336 0347 0362 0363 0364
T5      0067 0070 0105
UB      0003 0003 0399
X5      0067 0070 0105
YR      0006 0074 0080 0111 0114 0279 0417
BMS     0006 0029 0218 0219 0219 0221 0221 0222 0222 0223 0223 0224 0224 0225 0225 0226 0226 0227 0227
        0258 0343 0345 0345 0345 0345 0347 0347 0348 0348 0349 0349 0350 0350 0351 0351 0352 0352 0398
BMT     0006 0025 0168 0170 0213 0286 0288 0338
CAL     0006 0006 0110 0278
CTR     0006 0027 0232 0232 0233 0233 0234 0234 0235 0235 0236 0236 0237 0237 0238 0238 0246 0246 0247
        0247 0250 0250 0257 0364 0364 0365 0365 0366 0366 0367 0367 0368 0368 0369 0369 0371 0371 0371
        0371 0372 0372 0379 0379 0379 0379 0382 0385 0387 0388 0388
DAY     0006 0074 0075 0113 0245
DRY     0185 0186
FDA     0002 0051 0232 0232 0233 0233 0234 0234 0235 0235 0236 0236 0237 0237 0238 0238 0246 0246 0250
        0250 0364 0364 0365 0365 0366 0366 0367 0367 0368 0368 0369 0369 0371 0371 0371 0371 0379 0379
        0379 0379 0385 0387
EOR     0002 0210 0212 0227 0238
EST     0019 0143 0186
GOD     0156 0157
IMC     0007 0099 0132
IRR     0008 0099 0135
IYR     0007 0099 0132
JJJ     0113 0114 0132 0160 0165 0168 0173 0239 0281 0282 0288 0329 0345 0356 0363
KAY     0004 0104 0173 0405
KMC     0076 0077 0077 0077 0107 0275 0384
LAI     0002 0117 0119 0120 0174 0185 0186 0239 0240 0290 0310
LIM     0110 0111 0113 0278 0279 0281
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*****FORTRAN CROSS REFERENCE LISTING*****

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SYMBOL  INTERNAL STATEMENT NUMBERS
LOC     0006  0065  0072
MMM     0107  0275  0364
MMC     0079  0110  0111  0114  0132  0160  0165  0168  0173  0239  0242  0242  0243  0243  0243  0259  0278  0279  0282
        0288  0329  0345  0356  0363  0373  0373  0374  0374  0374  0383  0385  0389  0389  0390  0390  0390
MOD     0111  0279
PMC     0006  0096  0104  0160  0168  0282  0288  0329
RNS     0002  0187  0239
SMC     0005  0041  0173  0345  0405
SSD     0146  0174  0185  0186
SYP     0005  0040  0173  0405
TAU     0002  0021  0185  0186  0187  0239
TFD     0333  0336  0349  0361  0366
TIN     0067  0070  0073  0266
TMP     0145  0146
CNST    0067  0070  0186
COEF    0009  0095  0173
CVAL    0002  0256
DAYT    0006  0022  0121  0121  0125  0174  0186
DAY0    0316
DAY1    0313
DIFF    0004  0173
DISC    0006  0006  0240  0251  0254  0290
ETEO    0334  0337  0350  0367
EVAP    0186
FLAG    0006  0100  0135  0142  0186
FRMT    0010  0066  0117  0119
IDAY    0007  0099  0132
KDAY    0075  0281  0376
MAXT    0002  0117  0119  0128  0128  0145  0148  0171  0189  0190  0191  0199  0239
MINT    0002  0117  0119  0129  0129  0145  0149  0172  0239
MULT    0002  0067  0070  0173
OPTN    0011  0103  0165
PDAY    0006  0096  0104  0160  0168  0282  0288  0329
RAIN    0117  0119  0135  0135  0137  0137  0138  0139  0175  0226  0231  0237  0239  0240  0290  0314  0316
RFLG    0005  0036  0173  0219
SCLK    0005  0043  0173  0405
SDAY    0005  0042  0173  0345  0405
TACC    0002  0023  0173  0185  0239
TBSE    0002  0047  0221  0221  0222  0222  0223  0223  0224  0224  0225  0225  0226  0226  0227  0227  0347  0347  0348
        0349  0349  0349  0350  0350  0351  0351  0352  0352  0399  0401
TDAY    0002  0173
TECA    0002  0054  0337  0387  0393
TCDD    0002  0078  0157  0157  0165  0185  0239
THAF    0002  0262  0273  0324  0324
THAT    0002  0260  0270  0270  0273  0322  0322
THDF    0002  0265  0324  0327  0327  0329  0360  0363
THDT    0002  0264  0322  0325  0325  0363
THIF    0002  0263  0274  0324
THIT    0002  0261  0272  0272  0274  0322
TVAL    0002  0310  0317  0363
YEAR    0005  0080  0114  0132  0173
ZVAL    0002  0002  0270  0272  0313  0316  0317
ALPHA   0067  0070  0174  0185
BFLAG   0006  0093  0094  0116  0167  0213  0338  0356
BTFLG   0005  0035  0173
```

*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****

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SYMBOL  INTERNAL STATEMENT NUMBERS
CLOCK   0005  0037  0173
CDRNB   0014  0014  0409
COUNT   0021  0144  0186
COVER   0120  0121  0123  0123  0126  0126  0185  0186  0239
DELTA   0146
DISTR   0310
DRAIN   0016  0312  0313  0363  0369
FLDCP   0002  0067  0063
FMAXT   0148  0150  0150  0152  0152  0156
FMINT   0149  0151  0151  0154  0154  0156
GDDMC   0011  0103  0165  0356  0417
KVAL1   0002  0002  0310
KVAL2   0002  0002  0310
MOIST   0317
MXH2O   0002  0067  0070  0185  0294  0296
PLANT   0006  0064  0071
RATIO   0296  0297  0298  0298  0300  0300
STAGE   0011  0051  0162  0165  0229  0229  0230  0230  0231  0231  0267  0354  0356  0356  0359  0359  0360  0361  0361
        0362  0362  0408  0415  0415  0417
TRCDA   0002  0056  0401  0401  0404
TCORN   0013  0060  0229  0229  0230  0230  0231  0231  0329  0360  0361  0361  0362  0362  0409  0411
THETT   0002  0266  0291  0318  0319  0319  0320  0320  0321  0321  0322  0323  0323  0324  0363
TITLE   0006  0063  0069  0108  0276  0380
TRANS   0185
ALPHAV  0082  0084  0086  0090  0185
CLCKER  0173
CTIMER  0165
FALLRT  0008  0067  0070  0185  0294
GLDAGN  0011  0062  0160  0164  0215  0268  0282  0340
GDDDAY  0011  0103  0165  0356  0417
GDDVAL  0012  0012  0165  0417
ICOUNT  0005  0038  0173
IRRCHK  0007  0093  0097  0099  0130
LAYCHK  0092  0252
MFLDCP  0007  0068  0070  0176  0176
PCTEVA  0174
PTACCL  0002  0034  0173
RAINEW  0002  0138  0140
RAINOL  0002  0017  0138  0139
RUNOFF  0018  0311  0316  0363  0368
SCYSCR  0006  0081  0083  0101  0147  0158  0174  0185  0186  0188  0215  0282  0284  0292  0329  0340  0394
STCORN  0013  0058  0411  0411  0414
TAVAIL  0291  0294  0296
THEMAX  0002  0091  0256  0270  0273  0313  0316
THEMIN  0002  0091  0256  0272  0274  0317
THEVAL  0002  0091  0313  0316  0317  0318  0319  0320  0321  0323  0363
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LABEL	DEFINED	REFERENCES
100	0418	0061 0064 0065
101	0419	0066
102	0420	0067
103	0421	0069 0108 0276 0380
104	0422	0070
105	0423	0071
106	0424	0072
107	0425	0074 0076 0081 0092 0093 0096 0104
108	0426	0091
109	0427	0095
110	0428	0109
111	0429	0239
112	0430	0246 0250
113	0431	0367
114	0432	0371 0379
115	0433	0099
116	0434	0277
117	0435	0381
118	0436	0385
119	0437	0393
120	0438	0397
121	0442	0103
122	0439	0404
123	0440	0399
127	0441	0405
128	0443	0407
129	0445	0409
130	0446	0417
131	0444	0414
200	0048	0045
202	0047	0046
203	0052	0049
204	0051	0050
205	0054	0053
206	0248	0107
207	0241	0113
208	0256	0255
209	0270	0269
210	0272	0271
211	0377	0275
212	0370	0281
213	0392	0384
214	0387	0386
215	0403	0398
216	0402	0400
217	0056	0055
218	0044	0039
219	0060	0057 0059
301	0091	0083 0085 0089
302	0084	0083
303	0086	0083
304	0090	0083
305	0097	0094 0094
306	0095	0094
307	0119	0116
308	0117	0116
309	0120	0118

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES								
310	0126	0125								
311	0145	0140								
312	0174	0147	0158	0162	0164	0164	0166	0167	0170	0170
313	0167	0147								
314	0148	0147	0147							
315	0169	0167								
316	0171	0170								
317	0185	0178								
318	0196	0184	0189	0189						
319	0191	0188	0188							
320	0189	0188								
321	0190	0188								
322	0194	0139	0190	0191						
323	0198	0190	0190	0193						
324	0199	0195	0197							
325	0204	0199								
326	0212	0208								
327	0213	0211								
329	0232	0217	0228							
331	0251	0249								
332	0250	0117	0119							
333	0129	0125	0125							
355	0218	0213								
356	0229	0215								
359	0100	0097								
360	0105	0101								
361	0137	0130	0134							
362	0165	0164								
363	0135	0132								
400	0290	0284	0286							
401	0317	0314								
402	0336	0331								
403	0338	0335								
404	0343	0338								
405	0363	0342	0353							
406	0347	0343								
407	0379	0290								
408	0354	0340								
409	0359	0356								
410	0361	0354	0358							
411	0296	0292								
412	0302	0295								
500	0380	0252	0378							
501	0397	0396								
502	0407	0394								
503	0413	0408								
504	0412	0410								
999	0447	0063	0396	0396	0406					

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
A	SF	R*4	000F04	I	SF	I*4	000F08	J	SF	I*4	000F0C	K	SFA	I*4	000F10
M	SF	I*4	000F14	N	SF	I*4	000F18	T	SFA	R*4	000F1C	U	SFA	R*4	000F20
CO	SFA	I*4	001090	CV	SF	R*4	000F24	DL	SFA	R*4	000F28	DT	S	I*4	000F2C
FO	SFA	R*4	000F30	ES	SFA	R*4	000F34	ET	SF	R*4	000F38	II	SF	I*4	000F3C
KS	SFA	R*4	000F40	LB	F	R*4	001044	MO	SF	I*4	000F44	RN	SFA	R*4	000F48
SR	SFA	R*4	000F4C	TI	SFA	R*4	000F50	TN	SFA	R*4	000F54	TV	SFA	R*4	000F58
TX	SFA	R*4	000F5C	T2	SFA	R*4	000F60	T3	SFA	R*4	000F64	T5	SF	R*4	000F68
UR	F	R*4	0010C0	X5	SF	R*4	000F6C	YR	SFA	I*4	000F70	AMS	SF	I*4	000F74
BMT	S	I*4	000F78	CAL	F	I*4	00100C	CTR	SF	I*4	000F7C	DAY	SF	I*4	000F80
CRY	SFA	R*4	000F84	EOA	SF	R*4	00110C	EOR	SF	R*4	000F88	EST	SFA	R*4	000F8C
GDD	SF	R*4	000F90	IMC	S	I*4	0013B0	IRR	SF	R*4	001428	IYP	S	I*4	001440
JJJ	SFA	I*4	000F94	KAY	SFA	R*4	001518	KMO	SF	I*4	000F98	LAI	SFA	R*4	000F9C
LIM	SF	I*4	000FA0	LOC	SF	I*4	001530	MMM	SF	I*4	000FA4	MMO	SFA	I*4	000FA8
PMO	S	I*4	000FAC	RNS	SF	R*4	000FB0	SMO	SFA	I*4	001558	SSD	SFA	R*4	000FB4
SYR	SFA	I*4	001570	TAU	SFA	R*4	000FB8	TEO	SF	R*4	000FBC	TIN	SF	R*4	000FC0
TMP	SFA	R*4	000FC4	CNST	SFA	R*4	000FC8	COEF	SFA	R*4	001588	CVAL	S	R*4	001648
DAYT	SFA	I*4	000FCC	DAYO	SF XF	R*4	000000	DAY1	SF XF	R*4	000000	DIFF	SFA	R*4	000FD0
DISC	F	I*4	000FD4	ETEO	SF	R*4	000FD8	EVAP	SF XF	R*4	000000	FLAG	SFA	I*4	000FDC
FRNT	SF	R*8	001A00	IDAY	S	I*4	00165C	KDAY	SF	I*4	000FE0	MAXT	SF	R*4	000FE4
MINT	SF	R*4	000FE8	MULT	SFA	R*4	000FEC	OPTN	SFA	I*4	001604	PDAY	S	I*4	000FF0
RAIN	SFA	R*4	000FF4	RFLG	SFA	I*4	000FF8	SCLK	SFA	I*4	0016E8	SDAY	SFA	I*4	001700
TACC	SFA	R*4	000FFC	TRSE	SF	R*4	001718	TDAY	SFA	R*4	001000	TEDA	SF	R*4	001884
TGDD	SFA	R*4	001004	THAF	SF	R*4	001008	THAT	SF	R*4	00100C	THDF	SF	R*4	001010
THDT	SF	R*4	001014	THIF	SF	R*4	001018	THIT	SF	R*4	00101C	TVAL	SFA	R*4	001398
YEAR	SFA	I*4	001020	ZVAL	SFA	R*4	0019CC	ALPHA	SFA	R*4	001024	BFLAG	SF	I*4	001028
BTFLG	SFA	I*4	00102C	CLOCK	SFA	I*4	001030	CORNR	F	R*8	001820	COUNT	SFA	R*4	001034
COVER	SFA	R*4	001038	DELTA	F XF	R*4	000000	DISTR	SF XF	R*4	000000	DRAIN	SFA	R*4	00103C
FLGCP	SF	R*4	001040	FMAXT	SF	R*4	001044	FMINT	SF	R*4	001048	GODMD	SFA	I*4	0018E0
KVAL1	SFA	R*4	0018F4	KVAL2	SFA	R*4	001908	MOIST	SF XF	I*4	000000	MXH2O	SFA	R*4	00104C
PLANT	SF	I*4	00191C	RATIO	SF	R*4	001050	STAGE	SFA	I*4	001054	TBEDA	SF	R*4	00193C
TCCRN	SF	R*4	001970	THETT	SF	R*4	001058	TITLE	SF	I*4	001A00	TRANS	SF XF	R*4	000000
ALPHAV	SFA	R*4	00105C	CLOCKR	SF XF	R*4	000000	CTIMER	SF XF	R*4	000000	FALLPT	SFA	R*4	001060
CDDRGN	S	I*4	001064	GDDDAY	SFA	I*4	001450	GDDVAL	SFA	R*4	001A64	IBCOM#	F XF	I*4	000000
ICOUNT	SFA	I*4	001068	IRRCHK	SF	I*4	00106C	LAYCHK	S	I*4	001070	MFLDCP	SF	R*4	001074
PCTEVA	SF XF	R*4	000000	PTACC1	SFA	R*4	001078	RAINEW	S	R*4	00107C	RAINOL	SF	R*4	001080
RUNOFF	SFA	R*4	001084	SOYSOR	SFA	I*4	001088	STCCRN	SF	R*4	001A78	TAVAIL	SF	R*4	00108C
THEMAX	SFA	R*4	001A90	THEMIN	SFA	R*4	001AA4	THEVAL	SFA	R*4	001AB8				

LABEL	ADDR	LABEL	ADDR	LABEL	ADDR	LABEL	ADDR
218	001CC0	202	001CEA	200	001CF2	204	001D1C
203	001D24	205	001D38	217	001D50	219	001D82
302	002024	303	002030	304	00204C	301	002054
306	0020DC	305	002148	359	0021A4	360	002218
308	002318	307	002364	309	0023A4	310	0023F0
333	0023F4	363	00246A	361	002482	311	0024BC
314	0024FE	362	002598	313	0025AA	315	0025C0
316	0025DE	312	0025FC	317	00264C	320	00268C
321	00269C	319	0026AC	322	0026C8	318	0026D4
323	0026F4	324	0026FC	325	00270C	326	00275A
327	002762	355	002786	356	002800	329	00282C
207	00296C	206	0029FA	332	002A10	331	002A5E
208	002A90	209	002AF6	210	002E18	400	002C70
411	002CD4	412	002D1A	401	002DA6	402	002E86
403	002E9E	404	002EC4	406	002EF6	408	002F42
409	002F72	410	002F9E	405	002F86	212	00307C
211	003134	407	00314A	500	003188	214	003242
213	003274	501	0032CA	216	00336A	215	003370
502	003404	504	00349A	503	0034A0	999	003548

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*OPTIONS IN EFFECT*      NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,

*OPTIONS IN EFFECT*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF

*STATISTICS*   SOURCE STATEMENTS =     447 ,PROGRAM SIZE =    13688

*STATISTICS*  NO  DIAGNOSTICS GENERATED

****** END OF COMPILATION ******
```

```
      COMPILER OPTIONS - NAME= MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                         SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
ISN 0002            SUBROUTINE POTEVA(LAI,CFLAG,RN,SR,ALPHA,SSD,EC,DAYT)
               C
               C             SUBROUTINE:  CALCULATION OF POT. EVAP.
               C
               C     .....
ISN 0003            INTEGER CFLAG,DAYT
ISN 0004            REAL LAI
ISN 0005            IF(CFLAG-3)5,6,7
ISN 0006          5 IF (LAI.LT.3.0) GO TO 3
ISN 0008            IF (CFLAG-1) 1,1,2
               C
               C             FOR SORGHUM
               C
ISN 0009          1 RN=.8368*SR-130.78
ISN 0010            GO TO 4
               C
               C             FOR SOYBEAN
               C
ISN 0011          2 RN=.8049*SR-135.57
ISN 0012            GO TO 4
ISN 0013          3 RN=.7249*SR-50.11
ISN 0014            GO TO 4
               C
               C             FOR WHEAT
               C
ISN 0015          6 RN=.8678*SR-163.56
ISN 0016            IF(DAYT.LE.168)RN=.9593*SR-213.10
ISN 0018            IF(DAYT.GT.202) RN=.9258*SR-157.4208
ISN 0020            GO TO 4
               C
               C             FOR CORN
               C
ISN 0021          7 IF (LAI.GE.3.0) GO TO 8
ISN 0023            RN=.8608*SR-103.92
ISN 0024            GO TO 4
ISN 0025          8 RN=.849*SR-144.49
ISN 0026            IF (DAYT.GT.84) RN=.766*SR-99.84
ISN 0028          4 EC=ALPHA*SSD*RN/58.3
ISN 0029            RETURN
ISN 0030            END
```

```
*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****

SYMBOL  INTERNAL STATEMENT NUMBERS
EQ      0002  0028
RN      0002  0009  0011  0013  0015  0016  0018  0023  0025  0026  0028
SR      0002  0009  0011  0013  0015  0016  0018  0023  0025  0026
LAI     0002  0004  0006  0021
SSD     0002  0028
DAYT    0002  0003  0016  0018  0026
ALPHA   0002  0028
CFLAG   0002  0003  0005  0008
POTEVA  0002
```

LABEL	DEFINED	REFERENCES
1	0009	0003 0008
2	0011	0008
3	0013	0006
4	0028	0010 0012 0014 0020 0024
5	0006	0005
6	0015	0005
7	0021	0005
8	0025	0021

/ POTEVA / SIZE OF PROGRAM 00029A HEXADECIMAL BYTES PAGE 004

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
FO	S	R*4	0000DC	RN	SF	R*4	0000E0	SR	F	R*4	0000E4	LAI		R*4	0000E8
SSD	F	R*4	0000EC	DAYI		I*4	0000F0	ALPHA	F	R*4	0000F4	CFLAG		I*4	0000F8
POTEVA		R*4	0000FC												

LABEL	ADDR	LABEL	ADDR	LABEL	ADDR	LABEL	ADDR
5	000130	1	000144	2	000158	3	00016C
6	000130	7	0001C0	8	0001E0	4	000206


```
*OPTIONS IN EFFECT*      NAME= MAIN,OPT=02,LINECNT=60,SIZE=0000K,
*OPTIONS IN EFFECT*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
*STATISTICS*     SOURCE STATEMENTS =      29 ,PROGRAM SIZE =      666
*STATISTICS*  NO DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                99K BYTES OF CORE NOT USED
```

```
LEVEL 21.7 ( JAN 73 )                    OS/360  FORTRAN H                        DATE  77.084/14.38.55

          COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                             SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
                     C      .....
                     C      .....
  ISN 0002                  SUBROUTINE TRANS(TI,MXH2C,TV,KS,LAI,T,ALPHA,RN,SSD,COVER,TAU,
                           1ALPHAV,DRY,SOYSOR,T2,TGDD,TACC,FALLRT)
                     C
                     C                   SUBROUTINE:  CALCULATION OF TRANSPIRATION
                     C
                     C      .....
  ISN 0003                  REAL LAI,MXH2C,KS,T2,TGDD,TACC,FALLRT
  ISN 0004                  INTEGER SOYSOR
  ISN 0005                  TAVAIL=TI-(TV*1520.)
  ISN 0006                  KS=TAVAIL/(FALLRT*MXH2O)
  ISN 0007                  IF (KS.GT.1.) KS=1
  ISN 0009                  IF (KS.LT.0.0) KS=0.0
  ISN 0011                  GO TO (1,1,3,4),SOYSOR
                     C
                     C                 FOR SORGHUM AND SOYBEAN
                     C
  ISN 0012                1 TAU=EXP(-.398*LAI)
  ISN 0013                  IF (LAI-2.5) 53,51,51
                     C
                     C                 FOR WHEAT
                     C
  ISN 0014                3 TAU=EXP(-.737*LAI)
  ISN 0015                  IF (TACC.GT.3.OR.LAI.GE.1.25) GO TO 30
  ISN 0017                  GO TO 50
  ISN 0018               30 IF (TACC.GT.4) GO TO 52
  ISN 0020                  GO TO 51
                     C
                     C                 FOR CORN
                     C
  ISN 0021                4 DRY=LAI
  ISN 0022                  TAU=EXP(-.389*DRY+0.1438)
  ISN 0023                  IF (LAI.LE..38) TAU=1.
  ISN 0025                  IF (LAI.GE.2.5.OR.TGDD.GE.1400.) GO TO 41
  ISN 0027                  GO TO 50
  ISN 0028               41 IF (LAI.LT.2.5.AND.TGDD.GE.2000) GO TO 50
  ISN 0030                  GO TO 51
                     C
                     C
  ISN 0031               50 T=KS*ALPHAV*(1.0-TAU)*SSD*RN/58.3
  ISN 0032                  GO TO 99
  ISN 0033               51 T=KS*(ALPHA-TAU)*SSD*RN/58.3
  ISN 0034                  GO TO 99
  ISN 0035               52 T=KS*ALPHAV*(1-(EXP(-.737*LAI)))*SSD*RN/58.3
  ISN 0036                  GO TO 99
  ISN 0037               53 T=KS*ALPHAV*(1-(EXP(-.399*LAI)))*SSD*RN/58.3
                     C
                     C
  ISN 0038               99 IF (KS.EQ.0.0) GO TO 98
  ISN 0040                  T2=T*1/KS
  ISN 0041                  GO TO 97
  ISN 0042               98 T2=0.0
  ISN 0043               97 RETURN
  ISN 0044                  END
```

```
*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****          PAGE 002

SYMBOL   INTERNAL STATEMENT NUMBERS
T        0002  0031  0033  0035  0037  0040
KS       0002  0003  0006  0007  0007  0009  0009  0031  0033  0035  0037  0038  0040
RN       0002  0031  0033  0035  0037
TI       0002  0005
TV       0002  0005
T2       0002  0003  0040  0042
DRY      0002  0021  0022
EXP      0012  0014  0022  0035  0037
LAI      0002  0003  0012  0013  0014  0015  0021  0023  0025  0028  0035  0037
SSD      0002  0031  0033  0035  0037
TAU      0002  0012  0014  0022  0023  0031  0033
TACC     0002  0003  0015  0018
TCOD     0002  0003  0025  0029
ALPHA    0002  0033
COVER    0002
MXH2O    0002  0003  0006
TRANS    0002
ALPHAV   0002  0031  0035  0037
FALLST   0002  0003  0006
SCYSCR   0002  0004  0011
TAVAIL   0005  0006
```

LABEL	DEFINED	REFERENCES
1	0012	0011 0011
3	0014	0011
4	0021	0011
30	0018	0015
41	0028	0025
50	0031	0017 0027 0028
51	0033	0013 0013 0020 0030
52	0035	0018
53	0037	0013
97	0043	0041
98	0042	0038
95	0038	0032 0034 0036

/ TRANS / SIZE OF PROGRAM 000478 HEXADECIMAL BYTES PAGE 004

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
T	SF	R*4	0000EC	KS	SF	R*4	0000F0	RN	F	R*4	0000F4	TI	F	R*4	0000F8
TV	F	R*4	0000FC	T2	S	R*4	000100	DRY	SFA	R*4	000104	LAI	FA	R*4	000108
SSD	F	R*4	00010C	TAU	SF	R*4	000110	TACC		R*4	000114	TGDD		R*4	000118
ALPHA	F	R*4	00011C	COVER		R*4	000120	MXH2O	F	R*4	000124	TRANS		R*4	000128
EXP	XF	R*4	000000	ALPHAV	F	R*4	00012C	FALLRT	F	R*4	000130	SOYSGR	F	I*4	000134
TAVAIL	SF	R*4	000138												

LABEL	ADDR	LABEL	ADDR	LABEL	ADDR	LABEL	ADDR
1	0001BC	3	0001FC	30	000230	4	000240
41	000240	50	0002BC	51	0002E2	52	000302
53	000328	99	00034A	98	000368	97	000370

```
*OPTIONS IN EFFECT*      NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,

*OPTIONS IN EFFECT*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF

*STATISTICS*     SOURCE STATEMENTS =      43 ,PROGRAM SIZE =     1144

*STATISTICS*  NO  DIAGNOSTICS GENERATED

****** END OF COMPILATION ******                                    95K BYTES OF CORE NOT USED
```

```
LEVEL 21.7 ( JAN 73 )                    OS/360  FORTRAN H                        DATE  77.084/14.39.11

        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
  ISN 0002          SUBROUTINE EVAP(FLAG,LAI,RN,EST,ES,U,CNST,COUNT,SSD,DRY,COVER,
                   1DAYT,TAU,SOYSOR)
              C
              C                 SUBROUTINE:  CALCULATION OF SOIL EVAP.
              C
              C      .....
  ISN 0003          REAL LAI,MRNS
  ISN 0004          INTEGER FLAG,DAYT,SOYSOR
  ISN 0005          GO TO (2,6,6,5),SOYSOR
              C
              C                FOR SOYBEAN AND WHEAT
              C
  ISN 0006        6 IF (COVER.GT.LAI) TAU=.852
  ISN 0008          GO TO 2
              C
              C                FOR CORN
              C
  ISN 0009        5 TAU=EXP(-.389*DRY+0.1438)
  ISN 0010          IF (LAI.LE.0.38) TAU=1
  ISN 0012          IF (DAYT.GT.90.AND.LAI.LT.3.67) TAU=.270
              C
              C                 SWITCH AS TO WHICH SOIL EVAPORATION FORMULA
              C                 TO USE
              C
  ISN 0014        2 IF (FLAG-1) 1,3,3
  ISN 0015        1 ES=TAU*SSD*RN/58.3
  ISN 0016          EST=EST+ES
  ISN 0017          IF (EST.LE.U) GO TO 4
  ISN 0019          FLAG=2
  ISN 0020          ES=ES*0.6
  ISN 0021          GO TO 4
  ISN 0022        3 ES=CNST*(SQRT(COUNT)-SQRT(COUNT-1.0))
  ISN 0023          COUNT=COUNT+1.0
  ISN 0024        4 MRNS=TAU*RN/58.3
  ISN 0025          IF (MRNS.LT.ES) ES=MRNS
  ISN 0027          RETURN
  ISN 0028          END
```

```
SYMBOL  INTERNAL STATEMENT NUMBERS
U       0002  0017
ES      0002  0015  0016  0020  0020  0022  0025  0025
RN      0002  0015  0024
DRY     0002  0009
EST     0002  0016  0016  0017
EXP     0009
LAI     0002  0003  0006  0010  0012
SSD     0002  0015
TAU     0002  0006  0009  0010  0012  0015  0024
CNST    0002  0022
DAYT    0002  0004  0012
EVAP    0002
FLAG    0002  0004  0014  0019
MRNS    0003  0024  0025  0025
SQRT    0022  0022
COUNT   0002  0022  0022  0023  0023
COVER   0002  0006
SCYSCR  0002  0004  0005
```

*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****

LABEL	DEFINED	REFERENCES	
1	0015	0014	
2	0014	0005	0008
3	0022	0014	0014
4	0024	0017	0021
5	0009	0005	
6	0006	0005	0005

/ EVAP / SIZE OF PROGRAM 000342 HEXADECIMAL BYTES PAGE 004

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
U		R*4	0000C8	ES	SF	R*4	0000CC	RN	F	R*4	0000D0	DRY	FA	R*4	0000D4
EST	SF	R*4	0000D8	LAI		R*4	0000DC	SSD	F	R*4	0000E0	TAU	SF	R*4	0000E4
CNST	F	R*4	0000E8	DAYT		I*4	0000EC	EVAP		R*4	0000F0	FLAG	S	I*4	0000F4
HRNS	SF	R*4	0000F8	COUNT	SFA	R*4	0000FC	COVER		R*4	000100	SQRT	XF	R*4	000000
EXP	XF	R*4	000000	SCYSOR	F	I*4	000104								

```
LABEL   ADDR               LABEL   ADDR               LABEL   ADDR               LABEL   ADDR          PAGE 005
    6  00014A                  5  000162                  2  0001B8                  1  0001C2
    3  0001FB                  4  000242

*OPTIONS IN EFFECT*       NAME= MAIN,OPT=02,LINECNT=60,SIZE=0000K,

*OPTIONS IN EFFECT*       SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF

*STATISTICS*    SOURCE STATEMENTS =      27 ,PROGRAM SIZE =      834

*STATISTICS*  NO  DIAGNOSTICS GENERATED

****** END OF COMPILATION ******                               99K BYTES OF CORE NOT USED
```

```
COMPILER OPTIONS - NAME= MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                   SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
                 C        .....
ISN 0002                  FUNCTION DELTA(T)
                 C        .....
ISN 0003                  DELTA=0.0155416*T - 0.000005*T**3 + 0.0000001*T**4 + 0.40408273
ISN 0004                  RETURN
ISN 0005                  END
```

*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****   PAGE 002

```
SYMBOL   INTERNAL STATEMENT NUMBERS
T        0002  0003  0003  0003
DELTA    0002  0003
```

```
                                    /    DELTA /     SIZE OF PROGRAM 0000F6 HEXADECIMAL BYTES PAGE 003

     NAME    TAG   TYPE  ADD.        NAME    TAG   TYPE  ADD.        NAME    TAG   TYPE  ADD.        NAME    TAG   TYPE  ADD.
        T  F       R*4  000090       DELTA S       R*4  000094

 *OPTIONS IN EFFECT*       NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,

 *OPTIONS IN EFFECT*       SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF

 *STATISTICS*     SOURCE STATEMENTS =        4 ,PROGRAM SIZE =       246

 *STATISTICS*  NO  DIAGNOSTICS GENERATED

 ****** END OF COMPILATION ******                                     103K BYTES OF CORE NOT USED
```

```
LEVEL 21.7 ( JAN 73 )                    OS/360  FORTRAN H                                    DATE  77.084/14.39.55

        COMPILER OPTIONS - NAME= MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
                    C     .....
                    C       SUBROUTINE    CLOKER
                    C
                    C       PURPOSE      CALCULATE PART OF BIO-TIME TODAY,BAIER MODEL
                    C
                    C       DESCRIPTION OF PARAMETERS
                    C                  COEF:     COEFFICIENT TO CALCULATE TIME
                    C                  TN:       MIN TEMP
                    C                  TX:       MAX TEMP
                    C                  DL:       DAY LENGTH
                    C                  TACC:     TOTAL OF TIME PARTS
                    C                  TODAY:    TODAYS TIME PART
                    C                  K:        INDEX INTO COEF
                    C
  ISN 0002                SUBROUTINE CLOKER(COEF,TN,TX,DL,TODAY,K,MULT,TACC,CLOCK,MMO,JJJ,
                         *                  YEAR,BTFLG,DIFF,SYR,SMO,SDAY,SCLK,ICOUNT,
                         *                  RFLG,KAY,PTACC1)
                    C     .....
  ISN 0003                REAL COEF(6,8),TN,TX,DL,TODAY,MULT,TACC,DIFF,KAY(6),PTACC1
  ISN 0004                INTEGER K,CLOCK,MMO,JJJ,YEAR,BTFLG,SYR(6),SMO(6),SDAY(6),SCLK(6),
                         *       ICOUNT,RFLG
                    C
  ISN 0005                TX=((9./5.)*TX)+32.
  ISN 0006                TN=((9./5.)*TN)+32.
                    C
                    C     FIND DAYLENGTH CONTRIBUTION TO BIO-TIME
                    C
  ISN 0007                V1=COEF(K,2)*(DL-COEF(K,1))+COEF(K,3)*(DL-COEF(K,1))**2
  ISN 0008                IF(V1.LT.0.) V1=0.0
                    C
                    C     FIND MAX TEMP CONTRIBUTION TO BIO-TIME
                    C
  ISN 0010                V2=COEF(K,5)*(TX-COEF(K,4))+COEF(K,6)*(TX-COEF(K,4))**2
  ISN 0011                IF (V2.LT.0.0.OR.TX.LT.23.64) V2=0.0
                    C
                    C        FIND MIN TEMP CONTRIBUTION TO BIO-TIME
                    C
  ISN 0013                V3=COEF(K,7)*(TN-COEF(K,4))+COEF(K,8)*(TN-COEF(K,4))**2
  ISN 0014                IF(V3.LT.0.0) V3=0.0
                    C
                    C     TODAYS CONTRIBUTION TO BIO-TIME
                    C
  ISN 0016                TODAY=V1*(V2+V3)
                    C
                    C                   CUMMALATIVE SUMS FOR BMTS
                    C
  ISN 0017                IF(K.EQ.3.OR.K.EQ.4) TODAY=TODAY*MULT
  ISN 0019                TACC=TACC+TODAY
  ISN 0020                CLOCK=CLOCK+1
  ISN 0021                IF((MMO.GT.9.AND.MMO.LE.12).AND.TACC.GT.1.6) TACC=1.6
  ISN 0023                IF(BTFLG.EQ.1) GO TO 10
  ISN 0025                IF(K.EQ.3.AND.TACC.GE.2.7) GO TO 20
  ISN 0027                GO TO 30
  ISN 0028             20 BTFLG=1
  ISN 0029                GO TO 99
  ISN 0030             30 DIFF=TACC-PTACC1
```

```
ISN 0031             IF(SYR(2).EQ.0.AND.TACC.GE.2.8) GO TO 40
ISN 0033             IF((TACC.GE.1.95.AND.TACC.LT.2.8).AND.K.NE.3.) GO TO 50
ISN 0035             GO TO 10
ISN 0036          50 IF(DIFF.GE..02) ICOUNT=ICOUNT+1
ISN 0038             IF(ICOUNT.LT.10) GO TO 100
ISN 0040             KAY(2)=TACC
ISN 0041          40 TACC=2.00
ISN 0042             GO TO 99
ISN 0043          10 IF(RFLG.EQ.1) GO TO 111
ISN 0045             IF(TACC.GE.KAY(K).AND.K.LT.6) GO TO 99
ISN 0047             IF(TACC.LT.5.00) GO TO 100
ISN 0049             RFLG=1
ISN 0050          99 SYR(K)=YEAR
ISN 0051             SMO(K)=MMO
ISN 0052             SDAY(K)=JJJ
ISN 0053             SCLK(K)=CLOCK
ISN 0054             CLOCK=0
ISN 0055             IF(K.LT.6) K=K+1
ISN 0057         100 PTACC1=TACC
ISN 0058         111 RETURN
ISN 0059             END
```

```
SYMBOL  INTERNAL STATEMENT NUMBERS
K       0002  0004  0007  0007  0007  0007  0010  0010  0010  0010  0013  0013  0013  0013  0017  0017  0025  0033  0045
        0045  0050  0051  0052  0053  0055  0055  0055
DL      0002  0003  0007  0007
TN      0002  0003  0006  0006  0013  0013
TX      0002  0003  0005  0005  0010  0010  0011
V1      0007  0008  0008  0016
V2      0010  0011  0011  0016
V3      0013  0014  0014  0016
JJJ     0002  0004  0052
KAY     0002  0003  0040  0045
MMO     0002  0004  0021  0021  0051
SMO     0002  0004  0051
SYR     0002  0004  0031  0050
COEF    0002  0003  0007  0007  0007  0007  0010  0010  0010  0010  0013  0013  0013  0013
DIFF    0002  0003  0030  0036
MULT    0002  0003  0017
RFLG    0002  0004  0043  0049
SCLK    0002  0004  0053
SDAY    0002  0004  0052
TACC    0002  0003  0019  0019  0021  0021  0025  0030  0031  0033  0033  0040  0041  0045  0047  0057
TDAY    0002  0003  0016  0017  0017  0019
YEAR    0002  0004  0050
BTFLG   0002  0004  0023  0028
CLOCK   0002  0004  0020  0020  0053  0054
CLOCKER 0002
ICOUNT  0002  0004  0036  0036  0038
PTACC1  0002  0003  0030  0057
```

LABEL	DEFINED	REFERENCES		
10	0043	0023	0035	
20	0028	0025		
30	0030	0027		
40	0041	0031		
50	0036	0033		
95	0050	0029	0042	0045
100	0057	0038	0047	
111	0058	0043		

/ CLOKER / SIZE OF PROGRAM 000506 HEXADECIMAL BYTES PAGE 005

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
K	SF	I*4	000059	DL	F	R*4	0000EC	TN	SF	R*4	0000F0	TX	SF	R*4	0000F4
V1	SF	R*4	0000F8	V2	SF	R*4	0000FC	V3	SF	R*4	000100	JJJ	F	I*4	000104
KAY	S XR	R*4	000000	HMO	F	I*4	000108	SMO	S XR	I*4	000000	SYR	S XR	I*4	000000
COEF	F XR	R*4	000000	DIFF	S	R*4	00010C	MULT	F	R*4	000110	RFLG	S	I*4	000114
SCLK	S XR	I*4	000000	SDAY	S XR	I*4	000000	TACC	SF	P*4	000118	TDAY	SF	R*4	00011C
YEAR	F	I*4	000120	BTFLG	S	I*4	000124	CLOCK	SF	I*4	000128	CLOKER		R*4	00012C
ICOUNT	SF	I*4	000130	PTACCI	SF	R*4	000134								

```
    LABEL   ADDR                 LABEL   ADDR                 LABEL   ADDR                 LABEL   ADDR          PAGE 006

       20  000204                   30  0002DC                   50  000356                   40  000390
       10  00039C                   59  0003CC                  100  000412                  111  00041A

*OPTIONS IN EFFECT*       NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,

*OPTIONS IN EFFECT*       SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF

*STATISTICS*      SOURCE STATEMENTS =       58 ,PROGRAM SIZE =      1454

*STATISTICS*  NO  DIAGNOSTICS GENERATED

****** END OF COMPILATION ******                                          91K BYTES OF CORE NOT USED
```

123

```
            COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                               SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
                    C        .....
                    C
   ISN 0002                  SUBROUTINE CAY1(THEVAL,ZVAL,DRAIN,CD,THEMAX)
                    C
                    C                 SUBROUTINE TO CONTROL DRAINAGE.
                    C
                    C        .....
   ISN 0003                  INTEGER CD(5)
   ISN 0004                  DIMENSION THEVAL(5),ZVAL(5),TADD(5),THEMAX(5)
   ISN 0005                  DRAIN=0.0
   ISN 0006                  DO 4 I=1,5
   ISN 0007                  TADD(I)=0.0
   ISN 0008                  TADD(I)=DRAIN/ZVAL(I)
   ISN 0009                  TCK=THEVAL(I)+TADD(I)
   ISN 0010                  IF (TCK.LE..5) GO TO 1
   ISN 0012                  DRAIN=(TCK-.5)*ZVAL(I)
   ISN 0013                  GO TO 2
   ISN 0014         1        DRAIN=0.0
   ISN 0015         2        IF (THEVAL(I).LE.THEMAX(I)) GO TO 4
   ISN 0017                  IF (CD(I).LT.2) GO TO 3
   ISN 0019                  CD(I)=1
   ISN 0020                  GO TO 4
   ISN 0021         3        DRAIN=(THEVAL(I)-THEMAX(I))*ZVAL(I)+DRAIN
   ISN 0022                  THEVAL(I)=THEMAX(I)
   ISN 0023                  CD(I)=0
   ISN 0024         4        CONTINUE
   ISN 0025                  DO 6 I=2,5
   ISN 0026                  IF (TADD(I).EQ.0) GO TO 6
   ISN 0028                  CD(I)=2
   ISN 0029                  THEVAL(I)=THEVAL(I)+TADD(I)
   ISN 0030                  IF (THEVAL(I).GT..5) THEVAL(I)=.50
   ISN 0032         6        CONTINUE
   ISN 0033                  RETURN
   ISN 0034                  END
```

```
SYMBOL   INTERNAL STATEMENT NUMBERS
 I       0006  0007  0008  0008  0009  0009  0012  0015  0015  0017  0019  0021  0021  0021  0022  0022  0023  0025  0026
         0028  0029  0029  0029  0030  0030
 CD      0002  0003  0017  0019  0023  0028
 TCK     0009  0010  0012
 DAY1    0002
 TACD    0004  0007  0008  0009  0026  0029
 ZVAL    0002  0004  0008  0012  0021
 DRAIN   0002  0005  0008  0012  0014  0021  0021
 THEMAX  0002  0004  0015  0021  0022
 THEVAL  0002  0004  0009  0015  0021  0022  0029  0029  0030  0030
```

LABEL	DEFINED	REFERENCES		
1	0014	0010		
2	0015	0013		
3	0021	0017		
4	0024	0006	0015	0020
6	0032	0025	0026	

/ DAY1 / SIZE OF PROGRAM 000284 HEXADECIMAL BYTES PAGE 004

```
NAME    TAG    TYPE  ADD.       NAME    TAG    TYPE  ADD.       NAME    TAG    TYPE  ADD.       NAME     TAG    TYPE  ADD.
     I  SF     I*4   00008C        CD   S   XR I*4   000000       TCK   SF     R*4   000090       DAY1           R*4   000094
  TADD  SF     R*4   00009C      ZVAL   F   XR R*4   000000     DRAIN   SF     R*4   000098     THEMAX   F   XR R*4   000000
THEVAL  SF  XR R*4   000000
```

```
LABEL   ADDR              LABEL   ADDR              LABEL   ADDR              LABEL   ADDR          PAGE 005
    1  000164                 2  000168                 3  00018C                 4  0001A6
    6  000lEC

*OPTIONS IN EFFECT*    NAME= MAIN,OPT=02,LINECNT=60,SIZE=0000K,

*OPTIONS IN EFFECT*    SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF

*STATISTICS*    SOURCE STATEMENTS =      33 ,PROGRAM SIZE =      644

*STATISTICS*  NO  DIAGNOSTICS GENERATED

****** END OF COMPILATION ******                         103K BYTES OF CORE NOT USED
```

```
LEVEL 21.7 ( JAN 73 )                    OS/360  FORTRAN H                    DATE  77.084/14.40.23

            COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                               SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
                    C      .....
      ISN 0002             SUBROUTINE CAYO(THEVAL,RAIN,ZVAL,RUNOFF,CD,THEMAX)
                    C
                    C               SUBROUTINE TO CONTROL A RAIN.
                    C
                    C      .....
      ISN 0003             DIMENSION THEVAL(5),ZVAL(5),THEMAX(5)
      ISN 0004             INTEGER CD(5)
      ISN 0005             IF(RAIN.GT.25.4) GO TO 3
      ISN 0007             R=RAIN
      ISN 0008             RUNOFF=0.0
      ISN 0009             GO TO 4
      ISN 0010           3 R=25.4*(RAIN/25.4)**.75
      ISN 0011             RUNOFF=RAIN-R
      ISN 0012           4 DO 5 I=1,3
      ISN 0013             CK=(.5-THEVAL(I))*ZVAL(I)
      ISN 0014             IF (R.LT.CK) GO TO 6
      ISN 0016             THEVAL(I)=.5
      ISN 0017             CD(I)=2
      ISN 0018             R=R-CK
      ISN 0019        5    CONTINUE
      ISN 0020             RUNOFF=R+RUNOFF
      ISN 0021             GO TO 7
      ISN 0022           6 THEVAL(I)=THEVAL(I)+(R/ZVAL(I))
      ISN 0023             IF (THEVAL(I).GT.THEMAX(I)) CD(I)=2
      ISN 0025        7    RETURN
      ISN 0026             END
```

```
SYMBOL  INTERNAL STATEMENT NUMBERS
I       0012  0013  0013  0016  0017  0022  0022  0022  0023  0023  0023
R       0007  0010  0011  0014  0018  0018  0020  0022
CD      0002  0004  0017  0023
CK      0013  0014  0018
DAYO    0002
RAIN    0002  0005  0007  0010  0011
ZVAL    0002  0003  0013  0022
RUNOFF  0002  0003  0011  0020  0020
THEMAX  0002  0003  0023
THEVAL  0002  0003  0013  0016  0022  0022  0023
```

*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****

LABEL	DEFINED	REFERENCES
3	0010	0005
4	0012	0009
5	0019	0012
6	0022	0014
7	0025	0021

/ DAYO / SIZE OF PROGRAM 00028E HEXADECIMAL BYTES PAGE 004

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	00009C	R	SF	R*4	0000A0	CD	S XR	I*4	000000	CK	SF	R*4	0000A4
DAYO		R*4	0000A8	RAIN	F	R*4	0000AC	ZVAL	F XR	R*4	000000	FRXPR#	XF	R*4	000000
RUNOFF	SF	R*4	000080	THEMAX	XR	R*4	000000	THEVAL	SF XR	R*4	000000				

LABEL	ADDR	LABEL	ADDR	LABEL	ADDR	LABEL	ADDR
3	000130	4	000164	5	0001A8	6	0001C6
7	0001F2						


```
*OPTIONS IN EFFECT*      NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
*OPTIONS IN EFFECT*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
*STATISTICS*     SOURCE STATEMENTS =       25 ,PROGRAM SIZE =       654
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                          103K BYTES OF CORE NOT USED
```

```
          COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                             SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
                  C        .....
      ISN 0002             SUBROUTINE DISTR(T,TVAL,KVAL1,KVAL2,LAI)
                  C
                  C                SUBROUTINE TO CALCULATE THE TRANSPIRATION IN EACH LAYER.
                  C
                  C        .....
      ISN 0003             DIMENSION TVAL(5),KVAL1(5),KVAL2(5)
      ISN 0004             REAL KVAL1,KVAL2,LAI
      ISN 0005             IF (LAI.GT.1) GO TO 3
      ISN 0007             DO 2 I=1,5
      ISN 0008         2   TVAL(I)=T*KVAL1(I)
      ISN 0009             GO TO 5
      ISN 0010         3   DO 4 I=1,5
      ISN 0011         4   TVAL(I)=T*KVAL2(I)
      ISN 0012           5 RETURN
      ISN 0013             END
```

SYMBOL	INTERNAL STATEMENT NUMBERS					
I	0007	0008	0008	0010	0011	0011
T	0002	0008	0011			
LAI	0002	0004	0005			
TVAL	0002	0003	0008	0011		
DISTR	0002					
KVAL1	0002	0003	0004	0008		
KVAL2	0002	0003	0004	0011		

LABEL	DEFINED	REFERENCES
2	0008	0007
3	0010	0005
4	0011	0010
5	0012	0009

/ DISTR / SIZE OF PROGRAM 000192 HEXADECIMAL BYTES PAGE 004

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000084	T	F	R*4	000088	LAI		R*4	00008C	TVAL	S XR	R*4	000000
DISTR		R*4	000090	KVAL1	F XR	R*4	000000	KVAL2	F XR	R*4	000000				

```
LABEL   ADDR                  LABEL   ADDR                  LABEL   ADDR                  LABEL   ADDR          PAGE 005
    2  0000F0                     3  000102                     4  00010A                     5  000118
*OPTIONS IN EFFECT*     NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
*OPTIONS IN EFFECT*     SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
*STATISTICS*   SOURCE STATEMENTS =       12 ,PROGRAM SIZE =       402
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  103K BYTES OF CORE NOT USED
```

```
LEVEL 21.7 ( JAN 73 )                    OS/360  FORTRAN H                         DATE  77.084/14.40.47

            COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                               SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
                   C       .....
     ISN 0002              SUBROUTINE MOIST (THEVAL,ES,TVAL,ZVAL,THEMIN)
                   C
                   C             TO CALCULATE THE SOIL MOISTURE CONTENT IN EACH LAYER
                   C
                   C       .....
     ISN 0003              DIMENSION THEVAL(5),TVAL(5),ZVAL(5),THEMIN(5)
     ISN 0004              REAL ELEFT1,ELEFT2,RMD,ES
     ISN 0005              ELEFT1=ES
     ISN 0006              IF (ELEFT1.EQ.0.0) GO TO 2
     ISN 0008            1 DO 19 I=1,5
     ISN 0009              IF (THEVAL(I).EQ..1) GO TO 19
     ISN 0011              ELEFT2=ELEFT1/ZVAL(I)
     ISN 0012              TCK=THEVAL(I)-ELEFT2
     ISN 0013              IF (TCK.LT..1) GO TO 11
     ISN 0015              THEVAL(I)=TCK
     ISN 0016              GO TO 2
     ISN 0017           11 ELEFT2=THEVAL(I)-.1
     ISN 0018              ELEFT1=ELEFT1-(ELEFT2*ZVAL(I))
     ISN 0019              THEVAL(I)=.1
     ISN 0020           19 CONTINUE
                   C
                   C
     ISN 0021            2 DO 29 I=1,4
     ISN 0022              IF (TVAL(I).EQ.0.0) GO TO 29
     ISN 0024              IF (THEVAL(I).LE.THEMIN(I)) GO TO 21
     ISN 0026              TCK=THEVAL(I)-(TVAL(I)/ZVAL(I))
     ISN 0027              IF (TCK.LT.THEMIN(I)) GO TO 22
     ISN 0029              THEVAL(I)=TCK
     ISN 0030              GO TO 29
     ISN 0031           21 TVAL(I+1)=TVAL(I+1) + TVAL(I)
     ISN 0032              TVAL(I)=0.0
     ISN 0033              GO TO 29
     ISN 0034           22 RMD=THEVAL(I)-THEMIN(I)
     ISN 0035              TVAL(I+1)=TVAL(I+1)+(TVAL(I)-(RMD*ZVAL(I)))
     ISN 0036              TVAL(I)=RMD*ZVAL(I)
     ISN 0037              THEVAL(I)=THEMIN(I)
     ISN 0038           29 CONTINUE
                   C
                   C
     ISN 0039              THEVAL(5)=THEVAL(5)-(TVAL(5)/ZVAL(5))
                   C
     ISN 0040              RETURN
     ISN 0041              END
```

```
*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****

SYMBOL   INTERNAL STATEMENT NUMBERS
I        0008 0009 0011 0012 0015 0017 0018 0019 0021 0022 0024 0024 0026 0026 0026 0027 0029 0031 0031
         0031 0032 0034 0034 0035 0035 0035 0035 0036 0036 0037 0037
ES       0002 0004 0005
RMD      0004 0034 0035 0036
TCK      0012 0013 0015 0026 0027 0029
TVAL     0002 0003 0022 0026 0031 0031 0031 0032 0035 0035 0035 0036 0039
ZVAL     0002 0003 0011 0018 0026 0035 0036 0039
MOIST    0002
ELEFT1   0004 0005 0006 0011 0018 0018
ELEFT2   0004 0011 0012 0017 0018
THEMIN   0002 0003 0024 0027 0034 0037
THEVAL   0002 0003 0009 0012 0015 0017 0019 0024 0026 0029 0034 0037 0039 0039
```

LABEL	DEFINED	REFERENCES			
1	0008				
2	0021	0006	0016		
11	0017	0013			
19	0020	0008	0009		
21	0031	0024			
22	0034	0027			
29	0038	0021	0022	0030	0033

/ MOIST / SIZE OF PROGRAM 0002C2 HEXADECIMAL BYTES PAGE 004

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	00008C	ES	F	R*4	000090	RMD	SF	R*4	000094	TCK	SF	R*4	000098
TVAL	SF XR	R*4	000000	ZVAL	F XR	R*4	000000	MOIST		I*4	00009C	ELEFT1	SF	R*4	0000A0
ELEFT2	SF	R*4	0000A4	THEMIN	F XR	R*4	000000	THEVAL	SF XR	R*4	000000				

LABEL	ADDR	LABEL	ADDR	LABEL	ADDR	LABEL	ADDR
1	000112	11	000168	19	000186	2	000190
21	0001E6	22	0001FE	29	000224		


```
*OPTIONS IN EFFECT*      NAME= MAIN,OPT=02,LINECNT=60,SIZE=0000K,

*OPTIONS IN EFFECT*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF

*STATISTICS*     SOURCE STATEMENTS =      40 ,PROGRAM SIZE =      706

*STATISTICS*  NO  DIAGNOSTICS GENERATED

****** END OF COMPILATION ******                               99K BYTES OF CORE NOT USED
```

```
          COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,
                             SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF
  ISN 0002             SUBROUTINE CTIMER(TGDD,OPTN,GDDMO,GDDDAY,STAGE,JJJ,MMO,GDDVAL)
  ISN 0003             REAL TGDD,GDDVAL(5)
  ISN 0004             INTEGER OPTN(5),GDDMO(5),GDDDAY(5),STAGE
  ISN 0005             IF(OPTN(STAGE).EQ.0) GO TO 1
  ISN 0007             IF(GDDMO(STAGE).EQ.MMO.AND.GDDDAY(STAGE).EQ.JJJ) GO TO 2
  ISN 0009             GO TO 3
  ISN 0010           1 IF(TGDD.GE.GDDVAL(STAGE)) GO TO 2
  ISN 0012             GO TO 3
  ISN 0013           2 GDDMO(STAGE)=MMO
  ISN 0014             GDDDAY(STAGE)=JJJ
  ISN 0015             GDDVAL(STAGE)=TGDD
  ISN 0016             STAGE=STAGE+1
  ISN 0017           3 RETURN
  ISN 0018             END
```

*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****   PAGE 002

SYMBOL	INTERNAL STATEMENT NUMBERS									
JJJ	0002	0007	0014							
MMO	0002	0007	0013							
OPTN	0002	0004	0005							
TGDD	0002	0003	0010	0015						
GDDMO	0002	0004	0007	0013						
STAGE	0002	0004	0005	0007	0007	0010	0013	0014	0015	0016	0016
CTIMER	0002									
GDDDAY	0002	0004	0007	0014						
GDDVAL	0002	0003	0010	0015						

LABEL	DEFINED	REFERENCES
1	0010	0005
2	0013	0007 0010
3	0017	0009 0012

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
JJJ	F	I*4	000080	MMO	F	I*4	000084	OPTN	XR	I*4	000000	TGDD	F	R*4	000088
GDDMO	S XR	I*4	000000	STAGE	SF	I*4	00008C	CTIMER		R*4	000090	GDDDAY	S XR	I*4	000000
GCDVAL	S XR	R*4	000000												

```
    LABEL   ADDR                LABEL   ADDR                LABEL   ADDR                LABEL   ADDR          PAGE 005

        1  000102                   2  000112                   3  00012C

 *OPTIONS IN EFFECT*      NAME=  MAIN,OPT=02,LINECNT=60,SIZE=0000K,

 *OPTIONS IN EFFECT*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,XREF

 *STATISTICS*      SOURCE STATEMENTS =       17 ,PROGRAM SIZE =       472

 *STATISTICS*  NO  DIAGNOSTICS GENERATED

 ****** END OF COMPILATION ******                                   103K BYTES OF CORE NOT USED

 *STATISTICS*  NO  DIAGNOSTICS THIS STEP
```

F128-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LET,LIST,MAP
DEFAULT OPTION(S) USED - SIZE=(159744,24576)

MODULE MAP

CONTROL SECTION NAME	ORIGIN	LENGTH	ENTRY NAME	LOCATION	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION
MAIN	00	3578								
ROTEVA	3578	29A								
TRANS	3818	478								
EVAP	3C90	342								
DELTA	3FD8	F6								
CLCKER	40D0	5D6								
DAYL	46A8	284								
DAYO	4930	28E								
DISTR	4BC0	192								
MOIST	4D58	2C2								
CTIMER	5020	1D8								
IHCSEXP *	51F8	192	EXP	51F8						
IHCFRXPR*	5390	183	FRXPR#	5390						
IHCECOMH*	5518	F61	IBCOM#	5518	FDIOCS#	55D4	INTSWTCH	645E		
IHCCOMH2*	6480	65D	SEQDASD	67F8						
IHCSSQRT*	6AE0	145	SQRT	6AE0						
IHCFCVTH*	6C28	119D	ADCON#	6C28	FCVAOUTP	6CD2	FCVLOUTP	6D62	FCVZOUTP	6EB2
			FCVIOUTP	7260	FCVEOUTP	7762	FCVCOUTP	797C	INT6SWCH	7C63
IHCSLOG *	7DC8	1B6	ALOG10	7DC8	ALOG	7DE0				
IHCEFNTH*	7F80	542	ARITH#	7F80	ADJSWTCH	831C				
IHCEFIOS*	84C8	F28	FIOCS#	84C8	FIOCSBEP	84CE				
IHCFIOS2*	93F0	52E								
IHCERRM *	9920	5D4	ERRMON	9920	IHCERRE	9938				
IHCUOPT *	9EF8	300								
IHCETRCH*	A1F8	28E	IHCTRCH	A1F8	ERRTRA	A200				
IHCUATBL*	A488	208								

ENTRY ADDRESS 00
TOTAL LENGTH A690

****MAIN DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET

KSU MODEL 6 FOR WHEAT OF 1976-76

MAXIMUM AVAILABLE WATER (MM)..................	250.0000
THETA SUB V (15 BAR)..........................	0.1300
THETA INITIAL IN 5 FT. PROFILE (MM)............	293.5000
THETA SUB 5 CM. LAYER..........................	0.2000
U (MM)...	10.0000
ALPHA (P-T)....................................	1.3500
FALLRT...	0.6000
SOIL CONSTANT (MM DAY TO -1/2).................	3.5000
X SUB 5 (INIT.WATER CONTENT IN 5 CM. LAYER,WT..	0.1700
FIELD CAPACITY.................................	434.9998
BPTS MULTIPLIER................................	1.4000
PLANTING DATE..................................	OCT 1,1975
FIELD/LOCATION.................................	A. ZEMAN - 1975-76

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
9	1	36.7	19.4	1.00	337.54	574.0	337.5	0.0	0.0	0.0	6.622	1.450	0.0	0.0	1.450	293.50	0.64	0.0	0.0
9	2	35.6	20.0	1.00	314.51	550.0	314.5	0.0	0.0	0.0	6.103	1.112	0.0	0.0	1.112	292.05	0.63	0.0	0.0
9	3	36.7	22.2	1.00	174.46	404.0	174.5	0.0	0.0	0.0	3.461	0.938	0.0	0.0	0.938	290.94	0.62	0.0	0.0
9	4	33.9	18.3	1.00	224.34	456.0	224.3	0.0	0.0	0.0	4.241	0.826	0.0	0.0	0.826	290.00	0.62	0.0	0.0
9	5	29.4	18.3	1.00	78.53	304.0	78.5	0.0	0.0	2.00	1.408	0.747	0.0	0.0	0.747	291.17	0.62	0.0	0.0
9	6	29.4	11.1	1.00	334.66	571.0	334.7	0.0	0.0	0.0	5.826	0.687	0.0	0.0	0.687	290.43	0.62	0.0	0.0
9	7	34.4	15.6	1.00	318.35	554.0	318.4	0.0	0.0	0.0	5.992	0.639	0.0	0.0	0.639	289.74	0.61	0.0	0.0
9	8	31.7	17.8	1.00	233.93	466.0	233.9	0.0	0.0	0.0	4.298	0.601	0.0	0.0	0.601	289.10	0.61	0.0	0.0
9	9	33.3	17.2	1.00	104.43	331.0	104.4	0.0	0.0	0.0	1.953	0.568	0.0	0.0	0.568	288.50	0.61	0.0	0.0
9	10	31.1	18.9	1.00	104.43	140.0	-78.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	287.93	0.61	0.0	0.0
9	11	28.3	12.8	1.00	104.43	105.0	-112.4	0.0	0.0	19.60	0.0	0.0	0.0	0.0	0.0	307.53	0.61	0.0	0.0
9	12	21.1	7.8	1.00	304.92	540.0	304.9	0.0	0.0	0.0	4.676	3.464	0.0	0.0	3.464	307.53	0.73	0.0	0.0
9	13	22.8	11.1	1.00	225.30	457.0	225.3	0.0	0.0	0.0	3.595	2.663	0.0	0.0	2.663	304.07	0.71	0.0	0.0
9	14	20.0	10.0	1.00	225.30	112.0	-105.7	0.0	0.0	1.80	0.0	0.0	0.0	0.0	0.0	303.20	0.71	0.0	0.0
9	15	17.2	11.7	1.00	225.30	129.0	-89.4	0.0	0.0	1.30	0.0	0.0	0.0	0.0	0.0	304.50	0.71	0.0	0.0
9	16	22.2	15.0	1.00	57.42	282.0	57.4	0.0	0.0	0.30	0.926	0.686	0.0	0.0	0.686	304.80	0.71	0.0	0.0
9	17	22.2	14.4	1.00	116.90	344.0	116.9	0.0	0.0	8.60	1.880	1.392	0.0	0.0	1.392	312.72	0.77	0.0	0.0
9	18	21.1	15.6	1.00	116.90	165.0	-54.8	0.0	0.0	0.50	0.0	0.0	0.0	0.0	0.0	311.82	0.77	0.0	0.0
9	19	20.6	10.6	1.00	121.70	349.0	121.7	0.0	0.0	0.0	1.876	1.390	0.0	0.0	1.390	311.82	0.76	0.0	0.0
9	20	18.4	6.1	1.00	264.63	498.0	264.6	0.0	0.0	2.50	3.924	2.906	0.0	0.0	2.906	312.93	0.77	0.0	0.0
9	21	19.4	7.2	1.00	256.96	490.0	257.0	0.0	0.0	0.0	3.832	2.838	0.0	0.0	2.838	310.03	0.75	0.0	0.0
9	22	22.8	2.8	1.00	268.47	502.0	268.5	0.0	0.0	0.0	4.117	1.830	0.0	0.0	1.830	307.19	0.73	0.0	0.0
9	23	26.7	4.4	1.00	258.88	492.0	258.9	0.0	0.0	0.0	4.226	1.450	0.0	0.0	1.450	305.36	0.72	0.0	0.0
9	24	23.9	4.4	1.00	91.96	318.0	92.0	0.0	0.0	0.0	1.445	1.112	0.0	0.0	1.112	303.91	0.71	0.0	0.0
9	25	21.1	3.3	1.00	264.63	498.0	264.6	0.0	0.0	0.0	3.969	0.938	0.0	0.0	0.938	302.80	0.70	0.13	0.0
9	26	25.0	4.4	1.00	252.16	485.0	252.2	0.0	0.0	0.0	4.024	0.826	0.0	0.0	0.826	301.86	0.70	0.25	0.0
9	27	22.8	11.7	1.00	166.78	396.0	166.8	0.0	0.0	0.0	2.668	0.747	0.0	0.0	0.747	301.03	0.69	0.44	0.0
9	28	17.2	6.7	1.00	166.78	167.0	-52.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	300.28	0.69	0.57	0.0
9	29	25.6	3.3	1.00	264.63	498.0	264.6	0.0	0.0	1.50	4.234	0.687	0.0	0.0	0.687	301.78	0.69	0.68	0.0
9	30	23.3	12.2	1.00	264.63	54.0	-161.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	301.10	0.69	0.88	0.0
TOTALS										38.10	85.294	30.498	0.0	0.0	30.498				

KSU MODEL 6 FOR WHEAT CF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
10	1	20.0	0.0	1.00	223.38	455.0	223.4	0.0	0.0	0.30	3.235	0.639	0.0	0.0	0.639	301.40	0.69	1.01	0.0
10	2	23.3	2.8	1.00	235.85	468.0	235.9	0.0	0.0	0.0	3.647	0.601	0.0	0.0	0.601	300.76	0.69	1.03	0.0
10	3	27.2	7.2	1.00	232.01	464.0	232.0	0.0	0.0	0.0	3.863	0.568	0.0	0.0	0.568	300.16	0.68	1.05	0.0
10	4	28.3	6.7	0.99	215.08	448.0	216.7	0.01	0.01	0.0	3.651	0.540	0.021	0.0	0.561	299.59	0.68	1.06	0.0
10	5	28.3	11.1	0.99	195.08	427.0	196.5	0.01	0.01	0.0	3.374	0.516	0.019	0.0	0.536	299.03	0.68	1.09	0.0
10	6	30.6	5.6	0.99	189.36	421.0	190.8	0.01	0.01	0.0	3.291	0.495	0.019	0.0	0.514	298.49	0.67	1.10	0.0
10	7	28.3	11.7	0.99	198.89	431.0	200.4	0.01	0.01	0.0	3.448	0.476	0.020	0.0	0.496	297.98	0.67	1.13	0.0
10	8	30.0	8.9	0.99	168.12	400.0	170.6	0.02	0.01	0.0	2.964	0.460	0.033	0.0	0.493	297.48	0.67	1.15	0.0
10	9	25.0	3.9	0.99	192.70	426.0	195.6	0.02	0.01	0.0	3.113	0.445	0.035	0.0	0.479	296.99	0.66	1.16	0.0
10	10	28.9	2.2	0.99	172.85	405.0	175.4	0.02	0.01	0.0	2.920	0.431	0.033	0.0	0.463	296.51	0.66	1.17	0.0
10	11	35.6	11.7	0.99	165.29	397.0	167.7	0.02	0.01	0.0	3.150	0.418	0.035	0.0	0.453	296.05	0.66	1.22	0.0
10	12	35.0	18.9	0.98	146.25	378.0	149.5	0.03	0.02	0.0	2.870	0.407	0.047	0.0	0.454	295.59	0.65	1.26	0.0
10	13	32.2	17.8	0.98	153.75	386.0	157.2	0.03	0.02	0.0	2.907	0.396	0.048	0.0	0.444	295.14	0.65	1.28	0.0
10	14	27.2	8.3	0.98	68.37	295.0	69.9	0.03	0.02	0.0	1.169	0.387	0.019	0.0	0.406	294.69	0.65	1.30	0.0
10	15	20.6	3.9	0.98	171.58	405.0	175.4	0.03	0.02	0.0	2.616	0.377	0.043	0.0	0.420	294.29	0.64	1.31	0.0
10	16	24.4	3.9	0.97	166.59	401.0	171.6	0.04	0.03	0.0	2.710	0.369	0.058	0.0	0.427	293.87	0.64	1.32	0.0
10	17	21.7	0.0	0.97	133.99	366.0	138.0	0.04	0.03	0.0	2.052	0.361	0.044	0.0	0.405	293.44	0.64	1.33	0.0
10	18	21.7	-2.8	0.96	158.90	394.0	164.9	0.05	0.04	0.0	2.416	0.354	0.064	0.0	0.418	293.04	0.64	1.33	0.0
10	19	26.7	4.4	0.96	135.78	369.0	140.9	0.05	0.04	0.0	2.300	0.347	0.061	0.0	0.407	292.62	0.63	1.35	0.0
10	20	33.9	1.7	0.96	141.21	376.0	147.6	0.06	0.04	0.0	2.611	0.340	0.082	0.0	0.422	292.21	0.63	1.36	0.0
10	21	30.6	2.2	0.96	67.79	296.0	70.9	0.06	0.04	0.0	1.205	0.334	0.038	0.0	0.372	291.79	0.63	1.37	0.0
10	22	30.6	16.1	0.95	90.07	321.0	94.8	0.07	0.05	0.0	1.708	0.328	0.062	0.0	0.390	291.42	0.63	1.39	0.0
10	23	26.7	10.6	0.95	90.07	138.0	-80.7	0.07	0.05	0.0	0.0	0.0	0.0	0.0	0.0	291.03	0.63	1.40	0.0
10	24	12.2	1.7	0.94	129.20	365.0	137.0	0.08	0.06	0.0	1.744	0.322	0.072	0.0	0.394	291.03	0.62	1.41	0.0
10	25	15.6	-6.7	0.94	140.95	378.0	149.5	0.08	0.06	0.0	1.923	0.317	0.079	0.0	0.396	290.63	0.62	1.41	0.0
10	26	21.7	3.3	0.94	114.78	350.0	122.7	0.09	0.07	0.0	1.855	0.312	0.085	0.0	0.397	290.24	0.62	1.42	0.0
10	27	28.3	9.4	0.94	13.34	237.0	14.3	0.09	0.07	0.0	0.243	0.229	0.011	0.0	0.240	289.84	0.61	1.44	0.0
10	28	20.0	5.0	0.93	41.76	265.0	45.0	0.10	0.07	0.0	0.668	0.302	0.034	0.0	0.336	289.60	0.61	1.45	0.0
10	29	20.6	-2.8	0.92	95.41	330.0	103.5	0.11	0.08	0.0	1.489	0.298	0.082	0.0	0.380	289.26	0.61	1.45	0.0
10	30	23.9	3.3	0.91	81.81	316.0	90.0	0.13	0.10	0.0	1.407	0.294	0.090	0.0	0.384	288.88	0.61	1.46	0.0
10	31	26.7	13.3	0.91	81.81	83.0	-133.5	0.15	0.11	0.0	0.0	0.0	0.0	0.0	0.0	288.50	0.61	1.48	0.0
TOTALS										0.30	70.548	11.662	1.234	0.0	12.896				

KSU MODEL 6 FOR WHEAT CF 1976-76

HO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	FNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
11	1	20.0	10.0	0.88	22.73	249.0	25.8	0.17	0.13	1.80	0.393	0.290	0.033	0.0	0.323	290.30	0.62	1.49	0.0
11	2	17.8	13.9	0.88	22.73	69.0	-146.9	0.19	0.14	12.70	0.0	0.0	0.0	0.0	0.0	302.68	0.62	1.51	0.0
11	3	17.2	13.9	0.88	22.73	170.0	-50.0	0.21	0.16	16.50	0.0	0.0	0.0	0.0	0.0	319.18	0.62	1.52	0.0
11	4	21.1	11.1	0.88	22.73	68.0	-147.9	0.23	0.17	6.10	0.0	0.0	0.0	0.0	0.0	325.28	0.62	1.54	0.0
11	5	18.9	12.2	0.88	22.73	58.0	-157.5	0.26	0.19	0.0	0.0	0.0	0.0	0.0	0.0	325.28	0.62	1.55	0.0
11	6	18.3	12.8	0.88	22.73	175.0	-45.2	0.28	0.21	0.0	0.0	0.0	0.0	0.0	0.0	325.28	0.62	1.56	0.0
11	7	23.9	7.8	0.80	54.85	294.0	68.9	0.31	0.23	0.0	1.100	0.648	0.221	0.0	0.869	325.28	0.85	1.58	0.0
11	8	22.6	3.3	0.78	60.37	303.0	77.6	0.34	0.25	0.0	1.193	0.683	0.258	0.0	0.946	324.41	0.85	1.58	0.0
11	9	17.2	7.8	0.78	60.37	68.0	-147.9	0.36	0.27	0.0	0.0	0.0	0.0	0.0	0.0	323.46	0.85	1.59	0.0
11	10	16.1	-2.8	0.76	70.95	320.0	93.9	0.38	0.28	0.30	1.251	0.700	0.297	0.0	0.997	323.76	0.84	1.60	0.0
11	11	15.6	6.1	0.74	54.91	299.0	73.7	0.40	0.30	0.0	1.026	0.566	0.252	0.0	0.818	322.76	0.83	1.60	0.0
11	12	10.0	-0.6	0.74	44.57	285.0	60.3	0.41	0.30	0.0	0.722	0.395	0.180	0.0	0.575	321.94	0.83	1.60	0.0
11	13	11.7	-8.3	0.73	57.62	304.0	78.5	0.42	0.31	0.0	0.921	0.501	0.234	0.0	0.734	321.37	0.83	1.60	0.0
11	14	22.2	-1.1	0.73	56.21	302.0	76.6	0.42	0.31	0.0	1.142	0.621	0.288	0.0	0.909	320.63	0.82	1.60	0.0
11	15	23.9	-1.1	0.73	35.54	273.0	48.8	0.43	0.32	0.0	0.746	0.403	0.191	0.0	0.593	319.72	0.81	1.60	0.0
11	16	22.8	2.2	0.73	44.62	286.0	61.3	0.43	0.32	0.0	0.937	0.505	0.238	0.0	0.744	319.13	0.81	1.60	0.0
11	17	20.0	6.7	0.73	44.62	192.0	-28.9	0.43	0.32	0.0	0.0	0.0	0.0	0.0	0.0	318.39	0.81	1.60	0.0
11	18	18.9	12.2	0.73	44.62	145.0	-74.0	0.43	0.32	0.0	0.0	0.0	0.0	0.0	0.0	318.39	0.81	1.60	0.0
11	19	17.2	4.4	0.73	44.62	76.0	-140.2	0.42	0.31	0.0	0.0	0.0	0.0	0.0	0.0	318.39	0.81	1.60	0.0
11	20	4.4	-2.8	0.73	44.62	90.0	-126.8	0.42	0.31	25.70	0.0	0.0	0.0	0.0	0.0	344.09	0.81	1.60	0.0
11	21	0.6	-6.7	0.73	22.43	254.0	30.6	0.42	0.31	0.0	0.272	0.148	0.082	0.0	0.230	344.09	0.98	1.60	0.0
11	22	7.2	-4.4	0.73	62.55	311.0	85.2	0.42	0.31	0.0	0.929	0.505	0.279	0.0	0.784	343.86	0.98	1.60	0.0
11	23	8.3	-6.7	0.73	62.55	159.0	-60.6	0.41	0.30	0.0	0.0	0.0	0.0	0.0	0.0	343.07	0.98	1.60	0.0
11	24	1.7	-7.8	0.74	31.10	266.0	42.1	0.41	0.30	0.0	0.383	0.210	0.112	0.0	0.322	343.07	0.97	1.60	0.0
11	25	-4.4	-10.0	0.74	31.10	75.0	-141.2	0.41	0.30	0.0	0.0	0.0	0.0	0.0	0.0	342.75	0.97	1.60	0.0
11	26	-8.3	-15.6	0.74	31.10	164.0	-55.8	0.41	0.30	7.60	0.0	0.0	0.0	0.0	0.0	350.35	0.97	1.60	0.0
11	27	-1.1	-20.0	0.74	4.90	229.0	6.6	0.40	0.30	0.0	0.048	0.026	0.014	0.0	0.041	350.35	1.00	1.60	0.0
11	28	5.6	-15.6	0.74	4.90	155.0	-64.4	0.40	0.30	0.0	0.0	0.0	0.0	0.0	0.0	350.31	1.00	1.60	0.0
11	29	20.6	5.0	0.74	4.90	68.0	-147.9	0.39	0.29	0.0	0.0	0.0	0.0	0.0	0.0	350.31	1.00	1.60	0.0
11	30	7.8	-8.9	0.75	15.01	243.0	20.0	0.39	0.29	5.80	0.213	0.118	0.062	0.0	0.180	356.11	1.00	1.60	0.0
TOTALS										76.50	11.275	6.324	2.741	0.0	9.065				

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
12	1	12.8	-8.3	0.75	15.01	211.0	-10.7	0.38	0.28	0.0	0.0	0.0	0.0	0.0	0.0	355.93	1.00	1.60	0.0
12	2	17.8	-1.1	0.76	9.32	235.0	12.3	0.38	0.28	0.0	0.171	0.096	0.048	0.0	0.144	355.93	1.00	1.60	0.0
12	3	20.0	-3.3	0.76	83.89	337.0	110.2	0.37	0.27	0.0	1.567	0.884	0.432	0.0	1.316	355.79	1.00	1.60	0.0
12	4	17.8	1.7	0.76	36.41	272.0	47.8	0.37	0.27	0.0	0.674	0.380	0.186	0.0	0.566	354.47	1.00	1.60	0.0
12	5	20.6	3.3	0.76	36.41	161.0	-58.7	0.36	0.27	0.0	0.0	0.0	0.0	0.0	0.0	353.91	1.00	1.60	0.0
12	6	4.4	-5.0	0.77	11.67	238.0	15.2	0.36	0.27	0.0	0.154	0.087	0.041	0.0	0.129	353.91	1.00	1.60	0.0
12	7	11.1	-5.0	0.77	11.67	216.0	-5.9	0.35	0.26	0.0	0.0	0.0	0.0	0.0	0.0	353.78	1.00	1.60	0.0
12	8	11.1	0.6	0.77	13.24	240.0	17.1	0.35	0.26	0.0	0.212	0.121	0.056	0.0	0.177	353.78	1.00	1.60	0.0
12	9	11.7	-5.0	0.77	13.24	198.0	-23.2	0.34	0.25	0.0	0.0	0.0	0.0	0.0	0.0	353.60	1.00	1.60	0.0
12	10	22.8	-0.6	0.78	1.39	224.0	1.8	0.34	0.25	0.0	0.027	0.016	0.007	0.0	0.022	353.60	1.00	1.60	0.0
12	11	12.2	-0.6	0.78	1.39	25.0	-189.1	0.33	0.24	0.0	0.0	0.0	0.0	0.0	0.0	353.58	1.00	1.60	0.0
12	12	2.2	-1.1	0.78	1.39	29.0	-185.3	0.33	0.24	0.0	0.0	0.0	0.0	0.0	0.0	353.58	1.00	1.60	0.0
12	13	14.4	1.1	0.78	1.39	79.0	-137.3	0.32	0.24	0.30	0.0	0.0	0.0	0.0	0.0	353.88	1.00	1.60	0.0
12	14	15.6	-7.2	0.78	1.39	53.0	-162.3	0.32	0.24	11.20	0.0	0.0	0.0	0.0	0.0	365.08	1.00	1.60	0.0
12	15	7.2	-11.1	0.80	15.92	243.0	20.0	0.31	0.23	0.0	0.206	0.122	0.049	0.0	0.170	365.08	1.00	1.60	0.0
12	16	3.9	-4.4	0.80	15.16	242.0	19.1	0.31	0.23	0.0	0.191	0.112	0.045	0.0	0.157	364.91	1.00	1.60	0.0
12	17	-1.1	-13.3	0.80	22.19	251.0	27.7	0.30	0.22	0.0	0.218	0.129	0.050	0.0	0.179	364.75	1.00	1.60	0.0
12	18	7.2	-16.1	0.81	28.55	259.0	35.4	0.29	0.21	0.0	0.349	0.208	0.077	0.0	0.286	364.57	1.00	1.60	0.0
12	19	15.0	-5.6	0.81	12.38	238.0	15.2	0.28	0.21	0.0	0.195	0.118	0.042	0.0	0.160	364.28	1.00	1.60	0.0
12	20	6.1	-3.3	0.81	0.67	223.0	0.8	0.28	0.21	0.0	0.009	0.005	0.002	0.0	0.007	364.12	1.00	1.60	0.0
12	21	6.1	-10.0	0.82	21.12	245.0	25.8	0.27	0.20	0.0	0.260	0.158	0.054	0.0	0.212	364.12	1.00	1.60	0.0
12	22	6.1	-1.1	0.82	21.12	112.0	-105.7	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.0	363.90	1.00	1.60	0.0
12	23	1.7	-6.7	0.82	21.12	34.0	-180.5	0.26	0.19	0.0	0.0	0.0	0.0	0.0	0.0	363.90	1.00	1.60	0.0
12	24	5.6	-5.0	0.82	21.12	79.0	-137.3	0.26	0.19	0.0	0.0	0.0	0.0	0.0	0.0	363.90	1.00	1.60	0.0
12	25	1.7	-11.7	0.82	21.12	71.0	-145.0	0.25	0.19	0.0	0.0	0.0	0.0	0.0	0.0	363.90	1.00	1.60	0.0
12	26	6.7	-5.6	0.82	21.12	95.0	-122.0	0.25	0.19	0.0	0.0	0.0	0.0	0.0	0.0	363.90	1.00	1.60	0.0
12	27	6.7	-2.2	0.82	21.12	101.0	-116.2	0.24	0.18	0.0	0.0	0.0	0.0	0.0	0.0	363.90	1.00	1.60	0.0
12	28	5.6	0.0	0.82	21.12	31.0	-183.4	0.24	0.18	0.0	0.0	0.0	0.0	0.0	0.0	363.90	1.00	1.60	0.0
12	29	3.9	-0.6	0.82	21.12	73.0	-143.1	0.23	0.17	0.0	0.0	0.0	0.0	0.0	0.0	363.90	1.00	1.60	0.0
12	30	12.2	-7.2	0.84	18.51	245.0	21.9	0.23	0.17	0.0	0.262	0.164	0.047	0.0	0.211	363.90	1.00	1.60	0.0
12	31	6.7	-3.9	0.84	18.51	137.0	-81.7	0.22	0.16	0.0	0.0	0.0	0.0	0.0	0.0	363.69	1.00	1.60	0.0
TOTALS										11.50	4.493	2.600	1.137	0.0	3.736				

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
1	1	7.2	-1.1	0.84	18.51	132.0	-86.5	0.22	0.16	0.0	0.0	0.0	0.0	0.0	0.0	363.69	1.00	1.60	0.0
1	2	1.1	-11.7	0.84	18.51	200.0	-21.2	0.21	0.16	0.0	0.0	0.0	0.0	0.0	0.0	363.69	1.00	1.60	0.0
1	3	-5.6	-13.9	0.86	29.47	258.0	34.4	0.21	0.16	0.0	0.229	0.0	0.0	0.0	0.0	363.69	1.00	1.60	0.0
1	4	-2.2	-17.8	0.86	7.33	231.0	8.5	0.20	0.15	0.0	0.061	0.039	0.010	0.0	0.049	363.69	1.00	1.60	0.0
1	5	6.7	-7.2	0.86	7.33	217.0	-4.9	0.20	0.15	0.0	0.0	0.0	0.0	0.0	0.0	363.64	1.00	1.60	0.0
1	6	1.7	-12.8	0.86	7.33	109.0	-108.5	0.19	0.14	0.0	0.0	0.0	0.0	0.0	0.0	363.64	1.00	1.60	0.0
1	7	-12.2	-21.7	0.87	42.41	273.0	48.8	0.19	0.14	1.00	0.223	0.0	0.0	0.0	0.0	364.64	1.00	1.60	0.0
1	8	-7.2	-21.1	0.88	42.73	273.0	48.8	0.18	0.13	0.0	0.277	0.0	0.0	0.0	0.0	364.64	1.00	1.60	0.0
1	9	3.9	-13.9	0.88	20.88	247.0	23.8	0.18	0.13	0.0	0.218	0.142	0.031	0.0	0.173	364.64	1.00	1.60	0.0
1	10	6.7	-5.6	0.88	20.88	132.0	-86.5	0.17	0.13	0.0	0.0	0.0	0.0	0.0	0.0	364.47	1.00	1.60	0.0
1	11	13.3	-12.2	0.88	42.20	272.0	47.8	0.17	0.13	0.0	0.565	0.370	0.077	0.0	0.446	364.47	1.00	1.60	0.0
1	12	11.1	-2.8	0.88	42.20	204.0	-17.4	0.16	0.12	0.0	0.0	0.0	0.0	0.0	0.0	364.02	1.00	1.60	0.0
1	13	5.6	-1.1	0.88	42.20	214.0	-7.8	0.16	0.12	0.0	0.0	0.0	0.0	0.0	0.0	364.02	1.00	1.61	0.0
1	14	9.4	-11.1	0.90	49.69	280.0	55.5	0.15	0.11	0.30	0.605	0.401	0.073	0.0	0.474	364.32	1.00	1.61	0.0
1	15	10.6	-2.7	0.90	49.69	94.0	-122.9	0.15	0.11	0.0	0.0	0.0	0.0	0.0	0.0	363.85	1.00	1.61	0.0
1	16	8.3	-7.8	0.90	2.47	225.0	2.7	0.14	0.10	0.0	0.030	0.020	0.003	0.0	0.023	363.85	1.00	1.61	0.0
1	17	10.6	-4.4	0.90	2.47	126.0	-92.2	0.14	0.10	0.0	0.0	0.0	0.0	0.0	0.0	363.83	1.00	1.61	0.0
1	18	12.2	-6.1	0.91	28.64	255.0	31.5	0.13	0.10	0.0	0.380	0.256	0.040	0.0	0.296	363.83	1.00	1.61	0.0
1	19	9.4	0.0	0.91	28.64	203.0	-18.4	0.13	0.10	0.0	0.0	0.0	0.0	0.0	0.0	363.53	1.00	1.61	0.0
1	20	15.0	-11.1	0.92	55.20	285.0	60.3	0.12	0.09	0.0	0.745	0.505	0.073	0.0	0.578	363.53	1.00	1.61	0.0
1	21	12.8	-5.0	0.92	51.68	281.0	56.5	0.12	0.09	0.0	0.695	0.471	0.068	0.0	0.539	362.95	1.00	1.61	0.0
1	22	21.1	-7.8	0.92	53.44	283.0	58.4	0.12	0.09	0.0	0.825	0.559	0.081	0.0	0.640	362.41	1.00	1.61	0.0
1	23	18.3	-7.8	0.92	60.47	291.0	66.1	0.12	0.09	0.0	0.889	0.603	0.087	0.0	0.690	361.77	1.00	1.61	0.0
1	24	7.8	-2.2	0.92	20.22	245.0	21.9	0.11	0.08	0.0	0.247	0.168	0.022	0.0	0.191	361.08	1.00	1.61	0.0
1	25	4.4	-6.1	0.92	20.22	117.0	-100.9	0.11	0.08	0.0	0.0	0.0	0.0	0.0	0.0	360.89	1.00	1.61	0.0
1	26	-0.6	-14.4	0.93	89.88	323.0	96.8	0.10	0.07	2.30	0.766	0.527	0.063	0.0	0.590	363.19	1.00	1.61	0.0
1	27	11.1	-11.1	0.93	87.21	320.0	93.9	0.10	0.07	0.0	1.064	0.732	0.087	0.0	0.820	362.60	1.00	1.61	0.0
1	28	15.6	0.0	0.93	43.54	271.0	46.9	0.10	0.07	0.0	0.629	0.433	0.052	0.0	0.484	361.78	1.00	1.62	0.0
1	29	20.6	-6.7	0.93	67.60	298.0	72.8	0.10	0.07	0.0	1.025	0.705	0.084	0.0	0.790	361.30	1.00	1.62	0.0
1	30	14.4	-4.4	0.93	67.60	145.0	-74.0	0.10	0.07	0.0	0.0	0.0	0.0	0.0	0.0	360.51	1.00	1.62	0.0
1	31	15.6	-3.3	0.93	65.82	296.0	70.9	0.10	0.07	0.0	0.931	0.641	0.076	0.0	0.717	360.51	1.00	1.62	0.0
TOTALS										3.60	10.404	6.572	0.928	0.0	7.500				

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
2	1	12.2	2.2	0.94	7.95	231.0	8.5	0.09	0.07	0.0	0.109	0.075	0.008	0.0	0.083	359.79	1.00	1.63	0.0
2	2	8.3	-1.1	0.94	7.95	87.0	-129.6	0.09	0.07	0.0	0.0	0.0	0.0	0.0	0.0	359.71	1.00	1.63	0.0
2	3	12.8	-4.4	0.94	55.53	284.0	59.3	0.09	0.07	0.0	0.733	0.508	0.054	0.0	0.562	359.71	1.00	1.63	0.0
2	4	9.4	-10.6	0.94	55.53	220.0	-2.1	0.09	0.07	0.0	0.0	0.0	0.0	0.0	0.0	359.14	1.00	1.63	0.0
2	5	-5.6	-11.1	0.94	55.53	185.0	-35.6	0.09	0.07	0.0	0.0	0.0	0.0	0.0	0.0	359.14	1.00	1.63	0.0
2	6	-2.2	-13.9	0.94	79.77	311.0	85.2	0.09	0.07	0.0	0.641	0.445	0.048	0.0	0.492	359.14	1.00	1.63	-0.0
2	7	17.8	-14.4	0.94	112.92	347.0	119.8	0.08	0.06	0.0	1.530	0.641	0.101	0.0	0.742	358.65	1.00	1.63	0.0
2	8	21.1	-7.8	0.94	105.68	339.0	112.1	0.08	0.06	0.0	1.584	1.450	0.105	0.0	1.555	357.91	1.00	1.63	0.0
2	9	28.3	-1.1	0.94	33.33	259.0	35.4	0.08	0.06	0.0	0.576	0.572	-0.038	0.004	0.614	356.36	1.00	1.64	0.0
2	10	22.2	7.2	0.94	8.01	231.0	8.5	0.08	0.06	0.0	0.132	0.137	0.009	0.0	0.146	355.74	1.00	1.65	0.0
2	11	17.2	-7.8	0.94	129.20	365.0	137.0	0.08	0.06	0.0	1.807	0.826	0.120	0.0	0.946	355.60	1.00	1.65	0.0
2	12	25.0	1.7	0.94	97.54	330.0	103.5	0.08	0.06	0.0	1.630	0.747	0.108	0.0	0.855	354.65	1.00	1.66	0.0
2	13	15.6	-3.3	0.94	119.25	354.0	126.5	0.08	0.06	0.0	1.662	0.687	0.110	0.0	0.797	353.79	1.00	1.66	0.0
2	14	21.1	-2.8	0.94	119.25	118.0	-99.9	0.08	0.06	0.0	0.0	0.0	0.0	0.0	0.0	353.00	1.00	1.66	0.0
2	15	18.3	0.0	0.94	129.15	366.0	138.0	0.09	0.07	1.30	1.944	0.639	0.144	0.0	0.784	354.30	1.00	1.67	0.0
2	16	16.1	2.2	0.94	4.36	227.0	4.7	0.09	0.07	0.0	0.064	0.075	0.005	0.0	0.080	353.51	1.00	1.68	0.0
2	17	17.2	-1.7	0.93	133.55	372.0	143.8	0.10	0.07	0.0	1.967	0.568	0.162	0.0	0.730	353.43	1.00	1.68	0.0
2	18	20.6	-3.9	0.93	85.42	318.0	92.0	0.10	0.07	0.0	1.316	0.540	0.108	0.0	0.648	352.70	1.00	1.68	0.0
2	19	17.8	-4.4	0.92	151.14	393.0	163.9	0.11	0.08	0.0	2.228	0.516	0.201	0.0	0.717	352.06	1.00	1.68	0.0
2	20	27.2	3.3	0.92	96.47	332.0	105.4	0.12	0.09	0.0	1.607	0.495	0.157	0.0	0.652	351.34	1.00	1.70	0.0
2	21	15.6	-3.9	0.90	0.74	223.0	0.8	0.14	0.10	3.30	0.011	0.013	0.001	0.0	0.014	353.99	1.00	1.70	0.0
2	22	12.8	-8.9	0.90	169.08	419.0	188.8	0.15	0.11	0.50	2.260	0.460	0.273	0.0	0.733	354.47	1.00	1.70	0.0
2	23	24.4	-3.9	0.88	156.45	407.0	177.3	0.17	0.13	0.0	2.697	0.445	0.367	0.0	0.812	353.74	1.00	1.70	0.0
2	24	23.3	1.7	0.88	138.50	387.0	158.1	0.18	0.13	0.0	2.432	0.431	0.349	0.0	0.780	352.93	1.00	1.71	0.0
2	25	18.9	-0.6	0.87	127.48	375.0	146.6	0.19	0.14	0.0	2.079	0.418	0.314	0.0	0.732	352.15	1.00	1.71	0.0
2	26	23.9	-4.4	0.86	61.14	296.0	70.9	0.20	0.15	0.0	1.066	0.407	0.169	0.0	0.576	351.42	1.00	1.71	0.0
2	27	25.6	-1.7	0.85	129.58	381.0	152.4	0.22	0.16	0.0	2.382	0.396	0.412	0.0	0.808	350.84	1.00	1.72	0.0
2	28	21.7	-1.1	0.84	144.02	400.0	170.6	0.23	0.17	0.0	2.522	0.387	0.454	0.0	0.841	350.03	1.00	1.73	0.0
2	29	17.2	0.0	0.84	144.02	56.0	-159.4	0.25	0.19	0.0	0.0	0.0	0.0	0.0	0.0	349.19	1.00	1.73	0.0
TOTALS										5.10	34.978	11.877	3.816	0.004	15.697				

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
3	1	3.3	-1.7	0.84	144.02	109.0	-108.5	0.26	0.19	0.0	0.0	0.0	0.0	0.0	0.0	349.19	1.00	1.74	0.0
3	2	4.4	-0.6	0.84	144.02	91.0	-125.8	0.28	0.21	0.0	0.0	0.0	0.0	0.0	0.0	349.19	1.00	1.75	0.0
3	3	3.9	-6.1	0.81	51.02	288.0	63.2	0.29	0.21	0.0	0.623	0.377	0.138	0.0	0.516	349.19	1.00	1.75	0.0
3	4	1.7	-6.7	0.81	51.02	71.0	-145.0	0.31	0.23	17.30	0.0	0.0	0.0	0.0	0.0	365.97	1.00	1.75	0.0
3	5	-1.1	-12.8	0.79	139.32	406.0	176.4	0.32	0.24	6.10	1.396	0.817	0.339	0.0	1.156	372.07	1.00	1.75	0.0
3	6	8.3	-9.4	0.78	185.07	470.0	237.8	0.34	0.25	0.0	2.556	1.474	0.655	0.0	2.128	370.92	1.00	1.75	0.0
3	7	8.9	-6.7	0.77	137.02	407.0	177.3	0.35	0.26	0.0	1.976	1.131	0.519	0.0	1.650	368.79	1.00	1.75	0.0
3	8	5.0	1.1	0.77	137.02	103.0	-114.3	0.38	0.28	2.30	0.0	0.0	0.0	0.0	0.0	369.44	1.00	1.76	0.0
3	9	20.6	-2.2	0.74	167.06	456.0	224.3	0.40	0.30	1.00	3.239	1.787	0.956	0.0	2.742	370.44	1.00	1.76	0.0
3	10	16.7	2.2	0.73	171.66	466.0	233.9	0.42	0.31	0.0	3.244	1.763	0.998	0.0	2.761	367.70	1.00	1.78	0.0
3	11	19.4	4.4	0.73	171.66	124.0	-94.1	0.44	0.33	0.0	0.0	0.0	0.0	0.0	0.0	364.94	1.00	1.79	0.0
3	12	15.0	-8.9	0.71	50.79	297.0	71.8	0.47	0.35	0.0	0.900	0.472	0.305	0.0	0.776	364.94	1.00	1.79	0.0
3	13	11.1	-11.7	0.70	201.80	524.0	289.6	0.49	0.36	0.0	3.269	1.689	1.145	0.0	2.833	364.16	1.00	1.79	0.0
3	14	11.7	-3.3	0.69	119.80	404.0	174.5	0.51	0.38	0.0	2.121	1.079	0.768	0.0	1.847	361.33	1.00	1.79	0.0
3	15	10.0	-1.7	0.69	119.80	82.0	-134.4	0.53	0.39	0.0	0.0	0.0	0.0	0.0	0.0	359.48	1.00	1.80	0.0
3	16	15.0	-6.1	0.67	195.63	528.0	293.4	0.55	0.41	1.30	3.747	1.110	1.443	0.0	2.553	360.78	1.00	1.80	0.0
3	17	23.9	-3.9	0.66	175.75	501.0	267.5	0.57	0.42	0.0	4.035	1.450	1.599	0.0	3.049	358.23	1.00	1.80	0.0
3	18	27.2	6.7	0.64	149.10	464.0	232.0	0.60	0.44	0.0	3.853	1.112	1.591	0.159	2.863	355.18	1.00	1.82	0.0
3	19	28.9	10.0	0.63	123.83	426.0	195.6	0.62	0.46	0.0	3.366	0.938	1.426	0.143	2.507	352.31	1.00	1.85	0.0
3	20	22.8	4.4	0.61	147.00	464.0	239.1	0.66	0.49	0.0	3.697	0.826	1.645	0.0	2.472	349.81	1.00	1.87	0.0
3	21	19.4	-4.4	0.60	163.62	502.0	272.1	0.69	0.51	0.0	3.809	0.747	1.751	0.0	2.498	347.33	1.00	1.87	0.0
3	22	18.3	-3.9	0.58	168.49	521.0	288.6	0.73	0.54	0.0	3.975	0.687	1.876	0.0	2.563	344.84	0.98	1.87	0.0
3	23	26.7	1.7	0.57	165.08	524.0	291.2	0.77	0.57	0.0	4.694	0.639	2.266	0.0	2.905	342.27	0.96	1.88	0.0
3	24	22.8	6.7	0.55	161.24	526.0	292.9	0.81	0.60	0.0	4.577	0.601	2.247	0.0	2.848	339.37	0.95	1.91	0.0
3	25	33.3	4.4	0.53	64.71	328.0	121.1	0.85	0.63	0.0	2.151	0.568	1.072	0.0	1.640	336.52	0.93	1.92	0.0
3	26	28.3	5.0	0.53	64.71	128.0	-52.5	0.90	0.67	0.0	0.0	0.0	0.0	0.0	0.0	334.85	0.93	1.94	0.0
3	27	21.1	-4.4	0.50	161.80	564.0	325.9	0.95	0.70	1.30	4.691	0.540	2.521	0.0	3.062	336.18	0.92	1.95	0.0
3	28	18.3	8.9	0.50	161.80	162.0	-23.0	1.00	0.74	0.0	0.0	0.0	0.0	0.0	0.0	333.12	0.92	1.97	0.0
3	29	19.4	3.3	0.50	161.80	131.0	-49.9	1.05	0.78	0.0	0.0	0.0	0.0	0.0	0.0	333.12	0.92	1.99	0.0
3	30	14.4	0.6	0.44	146.41	568.0	329.4	1.10	0.81	9.10	4.343	1.430	2.688	0.0	4.118	342.22	0.96	2.00	0.0
3	31	16.7	-1.1	0.43	96.09	445.0	222.6	1.14	0.84	0.0	3.027	0.968	1.862	0.0	2.830	338.10	0.94	2.01	0.0
TOTALS										38.40	69.288	22.203	29.810	0.302	52.315				

KSU MODEL 6 FOR WHEAT CF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
4	1	24.4	-3.9	0.42	146.76	595.0	352.8	1.19	0.88	0.0	5.366	1.653	3.323	0.0	4.977	335.27	0.92	2.01	0.0
4	2	31.1	10.0	0.40	130.23	560.0	322.4	1.23	0.91	0.0	5.703	1.706	3.475	0.0	5.181	330.29	0.88	2.04	0.0
4	3	20.6	1.7	0.39	133.99	588.0	346.7	1.29	0.96	0.0	5.111	1.463	3.101	0.0	4.564	325.11	0.85	2.06	0.0
4	4	15.6	-1.7	0.37	19.24	248.0	51.7	1.34	0.99	0.0	0.686	0.189	0.407	0.0	0.596	320.55	0.82	2.07	0.0
4	5	25.6	-2.2	0.36	118.92	573.0	333.7	1.40	1.00	0.0	5.201	1.373	3.122	0.0	4.495	319.95	0.82	2.07	0.0
4	6	26.1	7.2	0.34	98.22	518.0	286.0	1.45	1.00	0.0	4.692	1.194	2.748	0.0	3.942	315.46	0.79	2.10	0.0
4	7	22.2	10.0	0.34	98.22	95.0	-81.1	1.53	1.00	0.0	0.0	0.0	0.0	0.0	0.0	311.51	0.79	2.13	0.0
4	8	17.2	9.4	0.31	14.82	244.0	48.2	1.60	1.00	10.40	0.702	0.160	0.449	0.0	0.609	321.91	0.83	2.16	0.0
4	9	23.9	2.8	0.29	90.62	554.0	317.2	1.70	1.00	0.0	4.944	1.046	3.214	0.0	4.261	321.31	0.82	2.18	0.0
4	10	28.9	11.1	0.27	69.21	489.0	260.8	1.80	1.00	0.30	4.509	0.886	2.892	0.0	3.778	317.34	0.80	2.21	0.0
4	11	24.4	6.7	0.26	2.78	201.0	10.9	1.85	1.00	0.0	0.174	0.033	0.109	0.0	0.142	313.57	0.77	2.24	0.0
4	12	23.9	1.1	0.25	85.47	588.0	346.7	1.90	1.00	0.0	5.361	0.979	3.383	0.0	4.362	313.42	0.77	2.25	0.0
4	13	26.7	11.7	0.24	56.19	461.0	236.5	1.95	1.00	0.0	3.985	0.701	2.440	0.0	3.141	309.06	0.74	2.29	0.0
4	14	31.1	17.2	0.23	56.94	475.0	248.6	2.00	1.00	0.0	4.528	0.768	2.715	0.0	3.483	305.92	0.72	2.32	0.0
4	15	25.6	15.6	0.22	36.57	378.0	164.5	2.04	1.00	4.80	2.778	0.458	1.696	0.0	2.153	307.24	0.73	2.00	0.0
4	16	22.2	10.0	0.22	82.20	624.0	377.9	2.07	1.00	48.30	5.953	0.959	4.994	0.0	5.953	353.38	1.00	2.03	0.0
4	17	22.2	11.1	0.22	82.20	116.0	-62.9	2.11	1.00	10.40	0.0	0.0	0.0	0.0	0.0	357.83	1.00	2.06	0.0
4	18	19.4	7.2	0.21	66.42	559.0	321.5	2.14	1.00	0.0	4.795	0.734	4.061	0.0	4.795	357.83	1.00	2.08	0.0
4	19	22.8	6.1	0.20	65.14	560.0	322.4	2.17	1.00	0.0	5.025	0.752	4.273	0.0	5.025	353.03	1.00	2.11	0.0
4	20	18.9	8.3	0.20	32.22	375.0	161.9	2.19	1.00	21.10	2.407	0.355	2.052	0.0	2.407	369.11	1.00	2.13	0.0
4	21	25.0	1.7	0.19	76.98	644.0	395.3	2.22	1.00	31.20	6.227	0.898	5.329	0.0	6.227	397.90	1.00	2.16	0.0
4	22	22.8	9.4	0.19	63.20	568.0	329.4	2.24	1.00	0.0	5.215	0.741	4.474	0.0	5.215	391.67	1.00	2.19	0.0
4	23	28.9	15.6	0.19	52.99	475.0	282.3	2.27	1.00	0.0	4.972	0.691	4.280	0.428	5.400	386.46	1.00	2.24	0.0
4	24	21.7	9.4	0.18	1.02	176.0	5.5	2.29	1.00	6.10	0.086	0.012	0.074	0.0	0.086	387.16	1.00	2.28	0.0
4	25	15.0	5.0	0.18	51.79	477.0	284.2	2.31	1.00	0.0	3.889	0.525	3.364	0.0	3.889	387.07	1.00	2.29	0.0
4	26	14.4	4.4	0.18	13.29	250.0	74.0	2.33	1.00	0.0	1.000	0.133	0.867	0.0	1.000	383.18	1.00	2.30	0.0
4	27	10.0	6.1	0.18	13.29	94.0	-70.4	2.35	1.00	0.0	0.0	0.0	0.0	0.0	0.0	382.18	1.00	2.31	0.0
4	28	8.9	5.0	0.18	13.29	69.0	-93.5	2.36	1.00	20.30	0.0	0.0	0.0	0.0	0.0	402.48	1.00	2.31	0.0
4	29	13.3	6.7	0.17	56.33	519.0	323.1	2.37	1.00	0.30	4.334	0.560	3.774	0.0	4.334	402.78	1.00	2.33	0.0
4	30	16.7	8.9	0.17	25.95	332.0	149.9	2.38	1.00	1.80	2.158	0.277	1.882	0.0	2.158	400.25	1.00	2.35	0.0
TOTALS										155.00	99.799	19.247	72.501	0.428	92.175				

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	PNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAC (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
5	1	22.2	1.7	0.17	76.02	648.0	442.5	2.39	1.00	1.30	6.693	0.852	5.841	0.0	6.693	399.39	1.00	2.38	0.0
5	2	21.1	8.3	0.17	76.41	654.0	448.1	2.40	1.00	0.0	6.890	0.870	6.020	0.0	6.890	392.70	1.00	2.41	0.0
5	3	17.8	-2.2	0.17	86.35	721.0	510.1	2.41	1.00	0.0	7.027	0.881	6.146	0.0	7.027	385.81	1.00	2.43	0.0
5	4	26.7	5.6	0.17	74.91	648.0	442.5	2.41	1.00	0.0	7.260	0.910	6.349	0.0	7.260	378.78	1.00	2.46	0.0
5	5	25.6	13.9	0.17	17.94	282.0	103.7	2.38	1.00	0.0	1.738	0.223	1.515	0.0	1.738	371.52	1.00	2.51	0.0
5	6	18.9	6.1	0.18	72.89	615.0	411.9	2.35	1.00	45.00	6.055	0.794	5.261	0.0	6.055	414.78	1.00	2.54	0.0
5	7	18.9	1.7	0.18	88.37	690.0	481.4	2.30	1.00	0.0	6.908	0.939	5.969	0.0	6.908	408.73	1.00	2.56	0.0
5	8	20.6	2.2	0.19	95.04	709.0	499.0	2.25	1.00	0.0	7.377	1.041	6.336	0.0	7.377	401.82	1.00	2.58	0.0
5	9	18.3	8.3	0.20	40.06	389.0	202.7	2.20	1.00	0.0	2.988	0.437	2.551	0.0	2.988	394.44	1.00	2.61	0.0
5	10	24.4	6.7	0.21	78.96	586.0	385.1	2.15	1.00	0.30	6.161	0.936	5.225	0.0	6.161	391.75	1.00	2.65	0.0
5	11	28.3	9.4	0.21	103.00	693.0	484.2	2.10	1.00	0.0	8.255	1.301	6.954	0.695	8.950	385.59	1.00	2.69	0.0
5	12	25.6	14.4	0.22	33.91	336.0	153.6	2.05	1.00	7.40	2.583	0.422	2.160	0.0	2.583	384.04	1.00	2.75	0.0
5	13	20.6	6.7	0.23	45.36	384.0	198.1	2.00	1.00	0.0	2.996	0.508	2.488	0.0	2.996	381.46	1.00	2.78	0.0
5	14	22.8	10.0	0.24	82.92	547.0	349.0	1.95	1.00	4.60	5.540	0.975	4.565	0.0	5.540	383.06	1.00	2.82	0.0
5	15	24.4	10.6	0.24	82.92	127.0	-39.8	1.90	1.00	0.0	0.0	0.0	0.0	0.0	0.0	377.52	1.00	2.86	0.0
5	16	22.8	9.4	0.26	16.80	241.0	65.7	1.85	1.00	0.0	1.040	0.197	0.843	0.0	1.040	377.52	1.00	2.90	0.0
5	17	22.2	3.9	0.27	140.28	741.0	528.6	1.80	1.00	0.0	8.084	1.589	6.495	0.0	8.084	376.48	1.00	2.93	0.0
5	18	24.4	2.2	0.28	143.76	734.0	522.1	1.75	1.00	0.0	8.181	1.669	6.513	0.0	8.181	368.40	1.00	2.97	0.0
5	19	28.9	12.8	0.29	142.54	709.0	499.0	1.70	1.00	0.0	8.687	1.838	6.849	0.685	9.372	360.22	1.00	3.03	0.0
5	20	29.4	13.9	0.30	129.78	643.0	437.9	1.65	1.00	0.0	7.711	1.693	6.018	0.602	8.312	350.85	1.00	3.07	0.0
5	21	28.3	16.1	0.31	97.64	513.0	317.5	1.60	1.00	0.0	5.566	1.268	4.153	0.0	5.421	342.53	0.97	3.11	0.0
5	22	27.2	15.6	0.32	29.53	270.0	92.5	1.55	1.00	5.60	1.596	0.226	1.179	0.0	1.406	342.71	0.97	3.15	0.0
5	23	25.6	13.3	0.33	20.83	238.0	62.9	1.50	1.00	1.30	1.053	0.258	0.768	0.0	1.026	342.61	0.97	3.19	0.0
5	24	20.6	10.6	0.34	27.65	257.0	80.5	1.45	1.00	1.80	1.241	0.316	0.900	0.0	1.215	343.38	0.97	3.21	0.0
5	25	21.1	11.7	0.36	121.73	539.0	341.6	1.40	1.00	1.50	5.338	1.409	3.826	0.0	5.235	343.66	0.97	3.24	0.0
5	26	17.8	11.7	0.36	121.73	123.0	-43.5	1.35	1.00	3.80	0.0	0.0	0.0	0.0	0.0	342.23	0.97	3.26	0.0
5	27	23.9	6.1	0.38	148.09	587.0	386.0	1.30	0.96	5.30	6.112	1.737	4.373	0.0	6.110	347.53	1.00	3.30	0.0
5	28	28.3	11.1	0.40	196.76	704.0	494.3	1.25	0.93	0.0	8.488	2.502	5.739	0.0	8.241	341.42	0.96	3.34	0.0
5	29	31.1	15.6	0.41	141.44	540.0	342.5	1.20	0.89	0.0	6.196	1.895	3.887	0.0	5.782	333.18	0.90	3.39	0.0
5	30	27.8	15.0	0.43	71.39	350.0	166.6	1.15	0.85	12.40	2.887	0.916	1.868	0.0	2.735	339.79	0.95	3.43	0.0
5	31	26.1	11.1	0.44	161.73	563.0	363.8	1.10	0.81	0.0	6.071	1.999	3.785	0.0	5.784	337.01	0.93	3.47	0.0
TOTALS										90.30	156.723	30.603	124.575	1.982	157.161				

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD. (LYS)	SCLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
6	1	29.9	11.7	0.48	197.14	615.0	411.9	1.00	0.74	0.0	7.139	2.531	4.105	0.0	6.636	331.23	0.89	3.51	0.0
6	2	29.4	13.9	0.52	200.29	590.0	388.8	0.90	0.67	0.0	6.846	2.613	3.584	0.0	6.197	324.59	0.85	3.56	0.0
6	3	28.3	16.7	0.55	261.82	680.0	472.1	0.80	0.59	0.0	8.295	2.044	3.936	0.0	5.980	318.39	0.81	3.60	0.0
6	4	27.8	11.7	0.60	293.45	701.0	491.6	0.70	0.52	0.0	8.401	1.450	3.587	0.0	5.036	312.41	0.77	3.64	0.0
6	5	26.7	12.8	0.64	247.47	586.0	385.1	0.60	0.44	0.0	6.520	1.112	2.500	0.0	3.612	307.38	0.73	3.68	0.0
6	6	27.8	13.9	0.69	272.16	595.0	393.4	0.50	0.40	0.0	6.787	0.938	2.342	0.0	3.280	303.76	0.71	3.73	0.0
6	7	28.9	15.6	0.74	296.43	600.0	398.1	0.40	0.40	0.0	7.010	0.826	2.156	0.0	2.982	300.48	0.69	3.77	0.0
6	8	30.0	16.1	0.85	350.19	614.0	411.0	0.30	0.40	0.0	7.353	0.747	1.989	0.0	2.736	297.50	0.67	3.82	0.0
6	9	32.2	18.3	0.85	371.49	641.0	436.0	0.20	0.40	0.0	8.081	0.687	1.889	0.0	2.575	294.76	0.65	3.87	0.0
6	10	35.6	21.1	0.85	317.85	573.0	373.1	0.10	0.40	0.0	7.271	0.639	1.430	0.0	2.069	292.19	0.63	3.93	0.0
6	11	35.0	17.8	0.85	390.42	665.0	458.2	0.0	0.40	6.60	8.757	5.527	1.500	0.0	7.027	296.72	0.66	3.99	0.0
6	12	32.8	21.1	0.85	424.33	708.0	498.0	0.0	0.40	0.0	9.394	5.929	0.0	0.0	5.929	289.69	0.61	4.04	0.0
6	13	37.8	16.1	0.85	418.02	700.0	490.6	0.0	0.40	0.0	9.626	3.645	0.0	0.0	3.645	283.76	0.57	4.17	0.0
6	14	36.1	21.7	0.85	279.99	525.0	328.6	0.0	0.40	0.0	6.461	1.450	0.0	0.0	1.450	280.12	0.55	4.34	0.0
6	15	25.0	12.8	0.85	347.03	610.0	407.3	0.0	0.40	0.0	6.748	1.112	0.0	0.0	1.112	278.67	0.54	4.43	0.0
6	16	35.6	6.1	0.85	417.24	699.0	489.7	0.0	0.40	0.0	8.997	0.938	0.0	0.0	0.938	277.56	0.53	4.50	0.0
6	17	34.4	19.4	0.85	338.36	599.0	397.1	0.0	0.40	0.0	7.589	0.826	0.0	0.0	0.826	276.62	0.53	4.64	0.0
6	18	30.0	12.2	0.85	440.90	729.0	517.5	0.0	0.40	0.0	9.113	0.747	0.0	0.0	0.747	275.79	0.52	4.74	0.0
6	19	27.8	8.3	0.85	406.98	686.0	477.7	0.0	0.40	0.0	8.049	0.687	0.0	0.0	0.687	275.04	0.52	4.81	0.0
6	20	31.1	11.1	0.85	453.52	745.0	532.3	0.0	0.40	0.0	9.458	0.639	0.0	0.0	0.639	274.36	0.51	4.90	0.0
6	21	31.1	17.2	0.85	405.40	684.0	475.8	0.0	0.40	0.0	8.665	0.601	0.0	0.0	0.601	273.72	0.51	5.03	0.0
6	22	32.2	16.1	0.85	336.78	597.0	395.3	0.0	0.40	0.0	7.262	0.568	0.0	0.0	0.568	273.12	0.50	5.15	0.0
6	23	33.3	20.6	0.85	336.78	98.0	-66.7	0.0	0.40	0.0	0.0	0.0	0.0	0.0	0.0	272.55	0.50	5.31	0.0
6	24	28.3	14.4	0.85	431.43	717.0	506.4	0.0	0.40	6.60	8.816	5.564	0.0	0.0	5.564	279.15	0.54	5.41	0.0
6	25	32.8	12.2	0.85	442.48	731.0	519.3	0.0	0.40	0.0	9.457	5.969	0.0	0.0	5.969	273.59	0.51	5.51	0.0
6	26	36.7	20.0	0.85	413.29	694.0	485.1	0.0	0.40	0.0	9.538	3.612	0.0	0.0	3.612	267.62	0.47	5.67	0.0
6	27	37.8	16.1	0.85	270.52	513.0	317.5	0.0	0.40	2.80	6.229	1.450	0.0	0.0	1.450	266.80	0.46	5.80	0.0
6	28	35.6	21.7	0.85	56.76	242.0	66.6	0.0	0.40	0.0	1.301	0.974	0.0	0.0	0.974	265.35	0.45	5.97	0.0
6	29	31.1	17.2	0.85	411.71	692.0	483.2	0.0	0.40	0.0	8.800	0.938	0.0	0.0	0.938	264.38	0.45	6.10	0.0
6	30	30.0	13.3	0.85	448.00	738.0	525.8	0.0	0.40	0.0	9.301	0.826	0.0	0.0	0.826	263.44	0.44	6.20	0.0
TOTALS										16.00	227.264	55.587	29.018	0.0	84.605				

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DAY	MAX TEMP (C)	MIN TEMP (C)	TAU	RNS RAD. (LYS)	SOLAR RAD (LYS)	NET RAD (LYS)	LEAF AREA	COVER	RAIN (MM)	POT. EVAP (MM)	SOIL EVAP (MM)	TRAN EVAP (MM)	A EVAP (MM)	TOTAL EVAP (MM)	THETA (MM)	KS	BMTS	GDD
7	1	27.8	15.0	0.85	385.68	659.0	452.7	0.0	0.40	2.80	7.845	0.747	0.0	0.0	0.747	265.42	0.45	6.31	0.0
7	2	28.3	18.3	0.85	244.49	480.0	287.0	0.0	0.40	3.00	5.076	0.687	0.0	0.0	0.687	267.67	0.47	6.45	0.0
7	3	27.2	18.3	0.85	244.49	170.0	-0.0	0.0	0.40	12.40	0.0	0.0	0.0	0.0	0.0	279.38	0.47	6.58	0.0
7	4	28.3	16.7	0.85	343.88	606.0	403.6	0.0	0.40	2.50	7.091	4.475	0.0	0.0	4.475	281.88	0.56	6.71	0.0
7	5	30.6	15.6	0.85	376.22	647.0	441.6	0.0	0.40	0.0	7.935	5.008	0.0	0.0	5.008	277.41	0.53	6.83	0.0
7	6	32.2	16.7	0.85	388.84	663.0	456.4	0.0	0.40	0.01	8.403	3.182	0.0	0.0	3.182	272.41	0.50	7.09	0.0
7	7	34.4	17.8	0.85	298.92	549.0	350.8	0.0	0.40	0.0	6.661	1.450	0.0	0.0	1.450	269.23	0.48	7.23	0.0
7	8	36.7	18.9	0.85	377.01	648.0	442.5	0.0	0.40	0.0	8.662	1.112	0.0	0.0	1.112	267.78	0.47	7.38	0.0
7	9	36.7	21.1	0.85	413.29	694.0	485.1	0.0	0.40	0.0	9.580	0.938	0.0	0.0	0.938	266.66	0.46	7.55	0.0
7	10	35.0	21.1	0.85	415.66	697.0	487.9	0.0	0.40	0.0	9.446	0.826	0.0	0.0	0.826	265.73	0.45	7.71	0.0
TOTALS										20.71	70.699	18.425	0.0	0.0	18.425				

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DY	THETA VALUES LAYER 1 0-5 CM	LAYER 2 5-30 CM	LAYER 3 30-60 CM	LAYER 4 60-90 CM	LAYER 5 90-180 CM	TRANSPIRATION LAYER 1 0-5 CM	LAYER 2 5-30 CM	LAYER 3 30-60 CM	LAYER 4 60-90 CM	LAYER 5 90-180 CM	RNOFF (MM)	DRAIN (MM)	THETA 0-150 CM	TRANS EVAP (MM)	TOT. EVAP (MM)	KS	DEPL. 0-90 CM	DEPL. 0-150 CM
9	1	0.100	0.214	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	298.55	0.0	1.45	0.0	36.4	56.9
9	2	0.100	0.210	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	297.44	0.0	1.11	0.0	37.2	57.3
9	3	0.100	0.206	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	296.50	0.0	0.94	0.0	37.8	57.7
9	4	0.100	0.203	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	295.67	0.0	0.83	0.0	38.4	58.1
9	5	0.125	0.203	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	296.93	0.0	0.75	0.0	37.6	57.5
9	6	0.111	0.203	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	296.24	0.0	0.69	0.0	38.0	57.8
9	7	0.100	0.202	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	295.60	0.0	0.64	0.0	38.5	58.1
9	8	0.100	0.200	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	295.00	0.0	0.60	0.0	38.9	58.3
9	9	0.100	0.198	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	294.43	0.0	0.57	0.0	39.3	58.6
9	10	0.100	0.198	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	294.43	0.0	0.0	0.0	39.3	58.6
9	11	0.492	0.198	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	314.03	0.0	0.0	0.0	25.7	50.4
9	12	0.423	0.198	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	310.57	0.0	3.46	0.0	28.1	51.8
9	13	0.237	0.224	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	307.90	0.0	2.66	0.0	29.9	53.0
9	14	0.273	0.224	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	309.70	0.0	0.0	0.0	28.7	52.2
9	15	0.299	0.224	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	311.00	0.0	0.0	0.0	27.8	51.7
9	16	0.291	0.224	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	310.62	0.0	0.69	0.0	28.0	51.8
9	17	0.435	0.224	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	317.83	0.0	1.39	0.0	23.0	48.8
9	18	0.445	0.224	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	318.33	0.0	0.0	0.0	22.7	48.6
9	19	0.417	0.224	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	316.94	0.0	1.39	0.0	23.7	49.2
9	20	0.282	0.250	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	316.53	0.0	2.91	0.0	23.9	49.4
9	21	0.225	0.250	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	313.69	0.0	2.84	0.0	25.9	50.5
9	22	0.189	0.250	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	311.86	0.0	1.83	0.0	27.2	51.3
9	23	0.160	0.250	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	310.41	0.0	1.45	0.0	28.2	51.9
9	24	0.137	0.250	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	309.30	0.0	1.11	0.0	29.0	52.4
9	25	0.119	0.250	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	308.36	0.0	0.94	0.0	29.6	52.8
9	26	0.102	0.250	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	307.54	0.0	0.83	0.0	30.2	53.1
9	27	0.100	0.247	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	306.79	0.0	0.75	0.0	30.7	53.4
9	28	0.100	0.247	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	306.79	0.0	0.0	0.0	30.7	53.4
9	29	0.116	0.247	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	307.60	0.0	0.69	0.0	30.1	53.1
9	30	0.116	0.247	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	307.60	0.0	0.0	0.0	30.1	53.1
TOTALS												0.0	0.0	-	0.0	30.5			

KSU MODEL 6 FOR WHEAT CF 1976-76

		THETA VALUES					TRANSPIRATION												
MO	DY	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	RNOFF	DRAIN	THETA	TRANS EVAP	TOT. EVAP	KS	DEPL.	DEPL.
		0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	(MM)	(MM)	0-150 CM	(MM)	(MM)		0-90 CM	0-150 CM
10	1	0.109	0.247	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	307.26	0.0	0.64	0.0	30.4	53.2
10	2	0.100	0.247	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	306.66	0.0	0.60	0.0	30.8	53.5
10	3	0.100	0.244	0.280	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	306.09	0.0	0.57	0.0	31.2	53.7
10	4	0.100	0.242	0.280	0.220	0.150	0.0	0.014	0.009	0.0	0.0	0.0	0.0	305.53	0.02	0.56	0.74	31.6	53.9
10	5	0.100	0.240	0.280	0.220	0.150	0.0	0.013	0.008	0.0	0.0	0.0	0.0	304.99	0.02	0.54	0.74	31.9	54.2
10	6	0.100	0.238	0.280	0.220	0.150	0.0	0.012	0.008	0.0	0.0	0.0	0.0	304.48	0.02	0.52	0.73	32.3	54.4
10	7	0.100	0.236	0.280	0.220	0.150	0.0	0.013	0.009	0.0	0.0	0.0	0.0	303.98	0.02	0.50	0.73	32.7	54.6
10	8	0.100	0.234	0.280	0.220	0.150	0.0	0.022	0.015	0.0	0.0	0.0	0.0	303.48	0.04	0.50	0.73	33.0	54.8
10	9	0.100	0.232	0.280	0.220	0.150	0.0	0.023	0.015	0.0	0.0	0.0	0.0	303.00	0.04	0.46	0.72	33.3	55.0
10	10	0.100	0.230	0.280	0.220	0.150	0.0	0.021	0.014	0.0	0.0	0.0	0.0	302.53	0.04	0.47	0.72	33.7	55.2
10	11	0.100	0.229	0.280	0.220	0.150	0.0	0.023	0.015	0.0	0.0	0.0	0.0	302.08	0.04	0.46	0.72	34.0	55.4
10	12	0.100	0.227	0.280	0.220	0.150	0.0	0.031	0.021	0.0	0.0	0.0	0.0	301.62	0.05	0.46	0.71	34.3	55.6
10	13	0.100	0.225	0.280	0.220	0.150	0.0	0.031	0.021	0.0	0.0	0.0	0.0	301.17	0.05	0.45	0.71	34.6	55.8
10	14	0.100	0.224	0.280	0.220	0.150	0.0	0.013	0.008	0.0	0.0	0.0	0.0	300.76	0.02	0.41	0.71	34.9	55.9
10	15	0.100	0.222	0.279	0.220	0.150	0.0	0.028	0.019	0.0	0.0	0.0	0.0	300.34	0.05	0.42	0.71	35.2	56.1
10	16	0.100	0.220	0.279	0.220	0.150	0.0	0.038	0.026	0.0	0.0	0.0	0.0	299.91	0.06	0.43	0.70	35.5	56.3
10	17	0.100	0.219	0.279	0.220	0.150	0.0	0.029	0.019	0.0	0.0	0.0	0.0	299.50	0.05	0.41	0.70	35.8	56.5
10	18	0.100	0.217	0.279	0.220	0.150	0.0	0.042	0.028	0.0	0.0	0.0	0.0	299.07	0.07	0.42	0.70	36.1	56.6
10	19	0.100	0.216	0.279	0.220	0.150	0.0	0.040	0.027	0.0	0.0	0.0	0.0	298.66	0.07	0.41	0.69	36.3	56.8
10	20	0.100	0.214	0.279	0.220	0.150	0.0	0.054	0.036	0.0	0.0	0.0	0.0	298.23	0.09	0.43	0.69	36.6	57.0
10	21	0.100	0.213	0.279	0.220	0.150	0.0	0.025	0.017	0.0	0.0	0.0	0.0	297.85	0.04	0.38	0.69	36.9	57.1
10	22	0.100	0.211	0.279	0.220	0.150	0.0	0.041	0.027	0.0	0.0	0.0	0.0	297.46	0.07	0.40	0.69	37.2	57.3
10	23	0.100	0.211	0.279	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	297.46	0.0	0.0	0.0	37.2	57.3
10	24	0.100	0.210	0.279	0.220	0.150	0.0	0.047	0.032	0.0	0.0	0.0	0.0	297.06	0.08	0.40	0.68	37.5	57.5
10	25	0.100	0.208	0.279	0.220	0.150	0.0	0.052	0.035	0.0	0.0	0.0	0.0	296.65	0.09	0.40	0.68	37.7	57.6
10	26	0.100	0.207	0.279	0.220	0.150	0.0	0.056	0.037	0.0	0.0	0.0	0.0	296.25	0.09	0.41	0.68	38.0	57.8
10	27	0.100	0.206	0.278	0.220	0.150	0.0	0.007	0.005	0.0	0.0	0.0	0.0	296.01	0.01	0.24	0.67	38.2	57.9
10	28	0.100	0.205	0.278	0.220	0.150	0.0	0.022	0.015	0.0	0.0	0.0	0.0	295.67	0.04	0.34	0.67	38.4	58.1
10	29	0.100	0.203	0.278	0.220	0.150	0.0	0.054	0.036	0.0	0.0	0.0	0.0	295.28	0.09	0.39	0.67	38.7	58.2
10	30	0.100	0.202	0.278	0.220	0.150	0.0	0.060	0.040	0.0	0.0	0.0	0.0	294.89	0.10	0.39	0.67	39.0	58.4
10	31	0.100	0.202	0.278	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	294.89	0.0	0.0	0.0	39.0	58.4
TOTALS												0.0	0.0		1.4	13.0			

KSU MODEL 6 FOR WHEAT OF 1976-76

		THETA VALUES					TRANSPIRATICN													
MO	DY	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	RNOFF	DRAIN	THETA	TRANS EVAP	TOT. EVAP	KS	DEPL.	DEPL.
		0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	0-. CM	CM	30-60 CM	60-90 CM	90-180 CM	(MM)	(MM)	0-150 CM	(MM)	(MM)		0-90 CM	0-150 CM
11	1	0.130	0.202	0.278	0.220	0.150	0.004	0.018	0.014	0.0	0.0	0.0	0.0	296.36	0.04	0.33	0.67	37.9	57.3
11	2	0.384	0.292	0.278	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	309.06	0.0	0.0	0.0	29.1	52.5
11	3	0.500	0.244	0.278	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	325.56	0.0	0.0	0.0	17.7	45.6
11	4	0.500	0.269	0.278	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	331.66	0.0	0.0	0.0	13.4	43.1
11	5	0.500	0.269	0.278	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	331.66	0.0	0.0	0.0	13.4	43.1
11	6	0.290	0.311	0.278	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	331.66	0.0	0.0	0.0	13.4	43.1
11	7	0.277	0.310	0.278	0.220	0.150	0.024	0.118	0.095	0.0	0.0	0.0	0.0	330.78	0.24	0.88	0.91	14.0	43.4
11	8	0.262	0.289	0.294	0.220	0.150	0.028	0.138	0.111	0.0	0.0	0.0	0.0	329.81	0.28	0.96	0.91	14.7	43.8
11	9	0.262	0.289	0.294	0.220	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	329.81	0.0	0.0	0.0	14.7	43.8
11	10	0.254	0.289	0.290	0.224	0.150	0.032	0.159	0.127	0.0	0.0	0.0	0.0	329.10	0.32	1.02	0.90	15.2	44.1
11	11	0.242	0.288	0.289	0.224	0.150	0.027	0.135	0.108	0.0	0.0	0.0	0.0	328.26	0.27	0.84	0.89	15.8	44.5
11	12	0.233	0.288	0.289	0.224	0.150	0.019	0.097	0.077	0.0	0.0	0.0	0.0	327.67	0.19	0.59	0.89	16.2	44.7
11	13	0.223	0.287	0.289	0.224	0.150	0.025	0.125	0.100	0.0	0.0	0.0	0.0	326.92	0.25	0.75	0.88	16.7	45.0
11	14	0.210	0.287	0.288	0.224	0.150	0.031	0.155	0.124	0.0	0.0	0.0	0.0	325.99	0.31	0.93	0.88	17.4	45.4
11	15	0.201	0.286	0.288	0.224	0.150	0.020	0.102	0.082	0.0	0.0	0.0	0.0	325.38	0.20	0.61	0.87	17.8	45.7
11	16	0.191	0.286	0.288	0.224	0.150	0.026	0.128	0.102	0.0	0.0	0.0	0.0	324.62	0.26	0.76	0.87	18.3	46.0
11	17	0.191	0.286	0.288	0.224	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	324.62	0.0	0.0	0.0	18.3	46.0
11	18	0.191	0.286	0.288	0.224	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	324.62	0.0	0.0	0.0	18.3	46.0
11	19	0.191	0.286	0.288	0.224	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	324.62	0.0	0.0	0.0	18.3	46.0
11	20	0.500	0.327	0.288	0.224	0.150	0.0	0.0	0.0	0.0	0.0	0.08	0.0	350.25	0.0	0.0	0.0	-0.5	35.3
11	21	0.497	0.326	0.287	0.224	0.150	0.008	0.042	0.033	0.0	0.0	0.0	0.0	350.01	0.08	0.23	1.00	0.7	35.4
11	22	0.279	0.331	0.317	0.224	0.150	0.029	0.143	0.114	0.0	0.0	0.0	0.0	349.22	0.29	0.79	1.00	1.2	35.7
11	23	0.279	0.331	0.317	0.224	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	349.22	0.0	0.0	0.0	1.2	35.7
11	24	0.275	0.290	0.324	0.252	0.150	0.012	0.058	0.046	0.0	0.0	0.0	0.0	348.90	0.12	0.33	1.00	1.5	35.9
11	25	0.275	0.290	0.324	0.252	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	348.90	0.0	0.0	0.0	1.5	35.9
11	26	0.427	0.290	0.290	0.286	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	356.50	0.0	0.0	0.0	-3.8	32.7
11	27	0.426	0.290	0.290	0.286	0.150	0.001	0.007	0.006	0.0	0.0	0.0	0.0	356.46	0.01	0.04	1.00	-3.8	32.7
11	28	0.290	0.317	0.290	0.286	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	356.46	0.0	0.0	0.0	-3.8	32.7
11	29	0.290	0.317	0.290	0.286	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	356.46	0.0	0.0	0.0	-3.8	32.7
11	30	0.404	0.290	0.312	0.286	0.150	0.006	0.031	0.025	0.0	0.0	0.0	0.0	362.08	0.06	0.18	1.00	-7.7	30.4
TOTALS												0.1	0.0		2.9	9.2			

KSU MODEL 6 FOR WHEAT OF 1976-76

MO	DY	THETA VALUES LAYER 1 0-5 CM	LAYER 2 5-30 CM	LAYER 3 30-60 CM	LAYER 4 60-90 CM	LAYER 5 90-180 CM	TRANSPIRATION LAYER 1 0-5 CM	LAYER 2 5-30 CM	LAYER 3 30-60 CM	LAYER 4 60-90 CM	LAYER 5 90-180 CM	RNOFF (MM)	DRAIN (MM)	THETA 0-150 CM	TRANS EVAP (MM)	TOT. EVAP (MM)	KS	DEPL. 0-90 CM	DEPL. 0-150 CM
12	1	0.404	0.290	0.312	0.286	0.150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	362.08	0.0	0.0	0.0	-7.7	30.4
12	2	0.288	0.312	0.290	0.308	0.150	0.005	0.024	0.019	0.0	0.0	0.0	0.0	361.93	0.05	0.14	1.00	-7.6	30.4
12	3	0.269	0.312	0.289	0.308	0.150	0.043	0.216	0.173	0.0	0.0	0.0	0.0	360.62	0.43	1.32	1.00	-6.7	31.0
12	4	0.261	0.290	0.307	0.290	0.156	0.019	0.093	0.074	0.0	0.0	0.0	0.0	358.24	0.19	0.57	1.00	-2.5	32.0
12	5	0.261	0.290	0.307	0.290	0.156	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.24	0.0	0.0	0.0	-2.5	32.0
12	6	0.260	0.290	0.290	0.307	0.156	0.004	0.021	0.017	0.0	0.0	0.0	0.0	358.11	0.04	0.13	1.00	-2.4	32.0
12	7	0.260	0.290	0.290	0.307	0.156	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.11	0.0	0.0	0.0	-2.4	32.0
12	8	0.257	0.289	0.290	0.290	0.162	0.006	0.028	0.022	0.0	0.0	0.0	0.0	356.22	0.06	0.18	1.00	1.3	32.8
12	9	0.257	0.289	0.290	0.290	0.162	0.0	0.0	0.0	0.0	0.0	0.0	0.0	356.22	0.0	0.0	0.0	1.3	32.8
12	10	0.257	0.289	0.290	0.290	0.162	0.001	0.003	0.003	0.0	0.0	0.0	0.0	356.20	0.01	0.02	1.00	1.3	32.8
12	11	0.257	0.289	0.290	0.290	0.162	0.0	0.0	0.0	0.0	0.0	0.0	0.0	356.20	0.0	0.0	0.0	1.3	32.8
12	12	0.257	0.289	0.290	0.290	0.162	0.0	0.0	0.0	0.0	0.0	0.0	0.0	356.20	0.0	0.0	0.0	1.3	32.8
12	13	0.263	0.289	0.290	0.290	0.162	0.0	0.0	0.0	0.0	0.0	0.0	0.0	356.50	0.0	0.0	0.0	1.1	32.7
12	14	0.487	0.299	0.290	0.290	0.162	0.0	0.0	0.0	0.0	0.0	0.0	0.0	367.70	0.0	0.0	0.0	-6.7	28.0
12	15	0.484	0.289	0.290	0.290	0.162	0.005	0.024	0.019	0.0	0.0	0.0	0.0	367.53	0.05	0.17	1.00	-6.6	28.1
12	16	0.288	0.328	0.290	0.290	0.162	0.004	0.022	0.018	0.0	0.0	0.0	0.0	367.37	0.04	0.16	1.00	-6.5	28.2
12	17	0.285	0.328	0.290	0.290	0.162	0.005	0.025	0.020	0.0	0.0	0.0	0.0	367.19	0.05	0.18	1.00	-6.4	28.3
12	18	0.281	0.290	0.321	0.290	0.162	0.008	0.039	0.031	0.0	0.0	0.0	0.0	366.91	0.08	0.29	1.00	-6.2	28.4
12	19	0.278	0.290	0.321	0.290	0.162	0.004	0.021	0.017	0.0	0.0	0.0	0.0	366.75	0.04	0.16	1.00	-6.0	28.4
12	20	0.278	0.290	0.290	0.321	0.162	0.000	0.001	0.001	0.0	0.0	0.0	0.0	366.74	0.00	0.01	1.00	-6.0	28.4
12	21	0.275	0.290	0.290	0.321	0.162	0.005	0.027	0.022	0.0	0.0	0.0	0.0	366.53	0.05	0.21	1.00	-5.9	28.5
12	22	0.275	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.41	0.0	0.0	0.0	0.6	29.8
12	23	0.275	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.41	0.0	0.0	0.0	0.6	29.8
12	24	0.275	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.41	0.0	0.0	0.0	0.6	29.8
12	25	0.275	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.41	0.0	0.0	0.0	0.6	29.8
12	26	0.275	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.41	0.0	0.0	0.0	0.6	29.8
12	27	0.275	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.41	0.0	0.0	0.0	0.6	29.8
12	28	0.275	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.41	0.0	0.0	0.0	0.6	29.8
12	29	0.275	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.41	0.0	0.0	0.0	0.6	29.8
12	30	0.271	0.290	0.290	0.290	0.172	0.005	0.024	0.019	0.0	0.0	0.0	0.0	363.20	0.05	0.21	1.00	0.7	29.9
12	31	0.271	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.20	0.0	0.0	0.0	0.7	29.9
TOTALS												0.0	0.0		1.1	3.7			

KSU MODEL 6 FOR WHEAT CF 1976-76

		THETA VALUES					TRANSPIRATION												
MO	DY	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	RNOFF	DRAIN	THETA	TRANS EVAP	TOT. EVAP	KS	DEPL.	DEPL.
		0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	(MM)	(MM)	0-150 CM	(MM)	(MM)		0-90 CM	0-150 CM
1	1	0.271	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.20	0.0	0.0	0.0	0.7	29.9
1	2	0.271	0.290	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.20	0.0	0.0	0.0	0.7	29.9
1	3	0.271	0.289	0.290	0.290	0.172	0.004	0.019	0.015	0.0	0.0	0.0	0.0	363.16	0.04	0.04	1.00	0.8	29.9
1	4	0.271	0.289	0.290	0.290	0.172	0.001	0.005	0.004	0.0	0.0	0.0	0.0	363.11	0.01	0.05	1.00	0.8	30.0
1	5	0.271	0.289	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.11	0.0	0.0	0.0	0.8	30.0
1	6	0.271	0.289	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.11	0.0	0.0	0.0	0.8	30.0
1	7	0.271	0.289	0.290	0.290	0.172	0.003	0.017	0.013	0.0	0.0	0.0	0.0	364.08	0.03	0.03	1.00	0.1	29.5
1	8	0.290	0.289	0.290	0.290	0.172	0.004	0.020	0.016	0.0	0.0	0.0	0.0	364.04	0.04	0.04	1.00	0.2	29.6
1	9	0.287	0.289	0.290	0.290	0.172	0.003	0.016	0.013	0.0	0.0	0.0	0.0	363.87	0.03	0.17	1.00	0.3	29.6
1	10	0.287	0.289	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.87	0.0	0.0	0.0	0.3	29.6
1	11	0.280	0.289	0.290	0.290	0.172	0.008	0.038	0.031	0.0	0.0	0.0	0.0	363.42	0.08	0.45	1.00	0.6	29.8
1	12	0.280	0.289	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.42	0.0	0.0	0.0	0.6	29.8
1	13	0.280	0.289	0.290	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.42	0.0	0.0	0.0	0.6	29.8
1	14	0.277	0.289	0.289	0.290	0.172	0.007	0.037	0.029	0.0	0.0	0.0	0.0	363.25	0.07	0.47	1.00	0.7	29.9
1	15	0.277	0.289	0.289	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.25	0.0	0.0	0.0	0.7	29.9
1	16	0.277	0.289	0.289	0.290	0.172	0.000	0.002	0.001	0.0	0.0	0.0	0.0	363.22	0.00	0.02	1.00	0.7	29.9
1	17	0.277	0.289	0.289	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	363.22	0.0	0.0	0.0	0.7	29.9
1	18	0.272	0.289	0.289	0.290	0.172	0.004	0.020	0.016	0.0	0.0	0.0	0.0	362.93	0.04	0.30	1.00	0.9	30.0
1	19	0.272	0.289	0.289	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	362.93	0.0	0.0	0.0	0.9	30.0
1	20	0.262	0.289	0.289	0.290	0.172	0.007	0.036	0.029	0.0	0.0	0.0	0.0	362.35	0.07	0.58	1.00	1.3	30.3
1	21	0.252	0.289	0.289	0.290	0.172	0.007	0.034	0.027	0.0	0.0	0.0	0.0	361.81	0.07	0.54	1.00	1.7	30.5
1	22	0.241	0.289	0.289	0.290	0.172	0.008	0.040	0.032	0.0	0.0	0.0	0.0	361.17	0.08	0.64	1.00	2.2	30.8
1	23	0.228	0.288	0.289	0.290	0.172	0.009	0.043	0.035	0.0	0.0	0.0	0.0	360.48	0.09	0.69	1.00	2.6	31.0
1	24	0.225	0.288	0.289	0.290	0.172	0.002	0.011	0.009	0.0	0.0	0.0	0.0	360.29	0.02	0.19	1.00	2.8	31.1
1	25	0.225	0.288	0.289	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360.29	0.0	0.0	0.0	2.8	31.1
1	26	0.260	0.288	0.289	0.290	0.172	0.006	0.031	0.025	0.0	0.0	0.0	0.0	362.00	0.06	0.59	1.00	1.6	30.4
1	27	0.246	0.288	0.289	0.290	0.172	0.009	0.044	0.035	0.0	0.0	0.0	0.0	361.18	0.09	0.82	1.00	2.2	30.8
1	28	0.237	0.288	0.289	0.290	0.172	0.005	0.026	0.021	0.0	0.0	0.0	0.0	360.70	0.05	0.48	1.00	2.5	31.0
1	29	0.222	0.288	0.289	0.290	0.172	0.008	0.042	0.034	0.0	0.0	0.0	0.0	359.91	0.08	0.79	1.00	3.0	31.3
1	30	0.222	0.288	0.289	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	359.91	0.0	0.0	0.0	3.0	31.3
1	31	0.210	0.288	0.288	0.290	0.172	0.008	0.038	0.031	0.0	0.0	0.0	0.0	359.19	0.08	0.72	1.00	3.5	31.6
TOTALS												0.0	0.0		1.0	7.6			

KSU MODEL 6 FOR WHEAT OF 1976-76

		THETA VALUES					TRANSPIRATION												
MO	DY	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	RNOFF	DRAIN	THETA	TRANS EVAP	TOT. EVAP	KS	DEPL.	DEPL.
		0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	(MM)	(MM)	0-150 CM	(MM)	(MM)		0-90 CM	0-150 CM
2	1	0.208	0.288	0.288	0.290	0.172	0.001	0.004	0.003	0.0	0.0	0.0	0.0	359.11	0.01	0.08	1.00	3.6	31.6
2	2	0.208	0.288	0.288	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	359.11	0.0	0.0	0.0	3.6	31.6
2	3	0.198	0.287	0.288	0.290	0.172	0.005	0.027	0.022	0.0	0.0	0.0	0.0	358.54	0.05	0.56	1.00	4.0	31.9
2	4	0.198	0.287	0.288	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.54	0.0	0.0	0.0	4.0	31.9
2	5	0.198	0.287	0.288	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.54	0.0	0.0	0.0	4.0	31.9
2	6	0.189	0.287	0.288	0.290	0.172	0.005	0.024	0.019	0.0	0.0	0.0	0.0	358.05	0.05	0.49	1.00	4.3	32.1
2	7	0.176	0.287	0.288	0.290	0.172	0.010	0.051	0.040	0.0	0.0	0.0	0.0	357.31	0.10	0.74	1.00	4.8	32.4
2	8	0.147	0.297	0.288	0.290	0.172	0.010	0.052	0.042	0.0	0.0	0.0	0.0	355.76	0.10	1.55	1.00	5.9	33.0
2	9	0.135	0.287	0.288	0.290	0.172	0.004	0.021	0.017	0.0	0.0	0.0	0.0	355.14	0.04	0.61	1.00	6.3	33.3
2	10	0.132	0.287	0.288	0.290	0.172	0.001	0.004	0.003	0.0	0.0	0.0	0.0	355.00	0.01	0.15	1.00	6.4	33.3
2	11	0.116	0.287	0.288	0.290	0.172	0.0	0.072	0.048	0.0	0.0	0.0	0.0	354.05	0.12	0.95	1.00	7.1	33.7
2	12	0.101	0.286	0.288	0.290	0.172	0.0	0.065	0.043	0.0	0.0	0.0	0.0	353.19	0.11	0.85	1.00	7.7	34.1
2	13	0.100	0.283	0.288	0.290	0.172	0.0	0.066	0.044	0.0	0.0	0.0	0.0	352.40	0.11	0.80	1.00	8.3	34.4
2	14	0.100	0.283	0.288	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	352.40	0.0	0.0	0.0	8.3	34.4
2	15	0.113	0.283	0.287	0.290	0.172	0.0	0.087	0.058	0.0	0.0	0.0	0.0	352.91	0.14	0.78	1.00	7.9	34.2
2	16	0.112	0.283	0.287	0.290	0.172	0.0	0.003	0.002	0.0	0.0	0.0	0.0	352.83	0.00	0.08	1.00	7.9	34.2
2	17	0.100	0.283	0.287	0.290	0.172	0.0	0.097	0.065	0.0	0.0	0.0	0.0	352.10	0.16	0.73	1.00	8.5	34.5
2	18	0.100	0.280	0.287	0.290	0.172	0.0	0.065	0.043	0.0	0.0	0.0	0.0	351.46	0.11	0.65	1.00	8.9	34.8
2	19	0.100	0.278	0.287	0.290	0.172	0.0	0.120	0.080	0.0	0.0	0.0	0.0	350.74	0.20	0.72	1.00	9.4	35.1
2	20	0.100	0.275	0.287	0.290	0.172	0.0	0.094	0.063	0.0	0.0	0.0	0.0	350.09	0.16	0.65	1.00	9.9	35.4
2	21	0.166	0.275	0.287	0.290	0.172	0.000	0.001	0.000	0.0	0.0	0.0	0.0	353.37	0.00	0.01	1.00	7.6	34.0
2	22	0.166	0.275	0.286	0.290	0.172	0.027	0.137	0.109	0.0	0.0	0.0	0.0	353.14	0.27	0.73	1.00	7.7	34.1
2	23	0.156	0.274	0.286	0.290	0.172	0.037	0.184	0.147	0.0	0.0	0.0	0.0	352.33	0.37	0.81	1.00	8.3	34.4
2	24	0.147	0.273	0.285	0.290	0.172	0.035	0.175	0.140	0.0	0.0	0.0	0.0	351.55	0.35	0.78	1.00	8.8	34.8
2	25	0.138	0.273	0.285	0.290	0.172	0.031	0.157	0.126	0.0	0.0	0.0	0.0	350.82	0.31	0.73	1.00	9.3	35.1
2	26	0.130	0.272	0.285	0.290	0.172	0.0	0.101	0.068	0.0	0.0	0.0	0.0	350.24	0.17	0.58	1.00	9.7	35.3
2	27	0.122	0.271	0.284	0.290	0.172	0.0	0.247	0.165	0.0	0.0	0.0	0.0	349.43	0.41	0.81	1.00	10.3	35.7
2	28	0.114	0.270	0.283	0.290	0.172	0.0	0.273	0.182	0.0	0.0	0.0	0.0	348.59	0.45	0.84	1.00	10.9	36.0
2	29	0.114	0.270	0.283	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	348.59	0.0	0.0	0.0	10.9	36.0
TOTALS												0.0	0.0		3.8	15.7			

KSU MODEL 6 FOR WHEAT CF 1976-76

MO	DY	THETA VALUES LAYER 1 0-5 CM	LAYER 2 5-30 CM	LAYER 3 30-60 CM	LAYER 4 60-90 CM	LAYER 5 90-180 CM	TRANSPIRATICN LAYER 1 0-5 CM	LAYER 2 5-30 CM	LAYER 3 30-60 CM	LAYER 4 60-90 CM	LAYER 5 90-180 CM	RNOFF (MM)	DRAIN (MM)	THETA 0-150 CM	TRANS EVAP (MM)	TOT. EVAP (MM)	KS	DEPL. 0-90 CM	DEPL. 0-150 CM
3	1	0.114	0.270	0.283	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	348.59	0.0	0.0	0.0	10.9	36.0
3	2	0.114	0.270	0.283	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	348.59	0.0	0.0	0.0	10.9	36.0
3	3	0.107	0.270	0.283	0.290	0.172	0.0	0.083	0.055	0.0	0.0	0.0	0.0	348.08	0.14	0.52	1.00	11.3	36.2
3	4	0.453	0.270	0.283	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	365.38	0.0	0.0	0.0	-0.8	29.0
3	5	0.403	0.284	0.283	0.290	0.172	0.034	0.169	0.136	0.0	0.0	0.0	0.0	370.32	0.34	1.16	1.00	-4.2	26.9
3	6	0.452	0.283	0.282	0.290	0.172	0.065	0.327	0.262	0.0	0.0	0.0	0.0	368.19	0.65	2.13	1.00	-2.7	27.8
3	7	0.266	0.314	0.281	0.290	0.172	0.052	0.260	0.208	0.0	0.0	0.0	0.0	366.54	0.52	1.65	1.00	-1.6	28.5
3	8	0.312	0.314	0.281	0.290	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	368.84	0.0	0.0	0.0	-3.2	27.6
3	9	0.295	0.288	0.300	0.290	0.172	0.096	0.478	0.382	0.0	0.0	0.0	0.0	367.10	0.96	2.74	1.00	-2.0	28.3
3	10	0.257	0.286	0.299	0.290	0.172	0.100	0.499	0.399	0.0	0.0	0.0	0.0	364.34	1.00	2.76	1.00	-0.0	29.4
3	11	0.257	0.286	0.290	0.299	0.172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	364.34	0.0	0.0	0.0	-0.0	29.4
3	12	0.247	0.285	0.290	0.299	0.172	0.030	0.152	0.122	0.0	0.0	0.0	0.0	363.56	0.30	0.78	1.00	0.5	29.8
3	13	0.211	0.283	0.288	0.290	0.175	0.115	0.573	0.458	0.0	0.0	0.0	0.0	359.84	1.15	2.83	1.00	4.3	31.3
3	14	0.188	0.282	0.287	0.290	0.175	0.077	0.384	0.307	0.0	0.0	0.0	0.0	358.00	0.77	1.85	1.00	5.6	32.1
3	15	0.188	0.282	0.287	0.290	0.175	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.00	0.0	0.0	0.0	5.6	32.1
3	16	0.189	0.279	0.285	0.290	0.175	0.144	0.721	0.577	0.0	0.0	0.0	0.0	356.74	1.44	2.55	1.00	6.5	32.6
3	17	0.157	0.276	0.283	0.290	0.175	0.160	0.800	0.640	0.0	0.0	0.0	0.0	353.69	1.60	3.05	1.00	8.6	33.9
3	18	0.131	0.272	0.281	0.290	0.175	0.175	0.875	0.700	0.0	0.0	0.0	0.0	350.83	1.75	2.86	1.00	10.6	35.1
3	19	0.112	0.268	0.279	0.290	0.175	0.0	0.941	0.628	0.0	0.0	0.0	0.0	348.32	1.57	2.51	1.00	12.3	36.1
3	20	0.100	0.264	0.276	0.290	0.175	0.0	0.987	0.658	0.0	0.0	0.0	0.0	345.85	1.65	2.47	1.00	14.0	37.1
3	21	0.100	0.256	0.274	0.290	0.175	0.0	1.053	0.702	0.0	0.0	0.0	0.0	343.35	1.75	2.50	1.00	15.8	38.2
3	22	0.100	0.249	0.272	0.290	0.175	0.0	1.134	0.756	0.0	0.0	0.0	0.0	340.77	1.89	2.58	0.99	17.6	39.3
3	23	0.100	0.241	0.268	0.290	0.175	0.0	1.370	0.913	0.0	0.0	0.0	0.0	337.85	2.28	2.92	0.97	19.6	40.5
3	24	0.100	0.233	0.265	0.290	0.175	0.0	1.359	0.906	0.0	0.0	0.0	0.0	334.99	2.26	2.86	0.95	21.6	41.7
3	25	0.100	0.228	0.264	0.290	0.175	0.0	0.648	0.432	0.0	0.0	0.0	0.0	333.34	1.08	1.65	0.93	22.7	42.4
3	26	0.100	0.228	0.264	0.290	0.175	0.0	0.0	0.0	0.0	0.0	0.0	0.0	333.34	0.0	0.0	0.0	22.7	42.4
3	27	0.115	0.222	0.261	0.290	0.175	0.0	1.510	1.007	0.0	0.0	0.0	0.0	331.58	2.52	3.06	0.92	23.9	43.1
3	28	0.115	0.222	0.261	0.290	0.175	0.0	0.0	0.0	0.0	0.0	0.0	0.0	331.58	0.0	0.0	0.0	23.9	43.1
3	29	0.115	0.222	0.261	0.290	0.175	0.0	0.0	0.0	0.0	0.0	0.0	0.0	331.58	0.0	0.0	0.0	23.9	43.1
3	30	0.266	0.220	0.259	0.288	0.175	0.127	0.635	0.635	0.635	0.508	0.0	0.0	336.88	2.54	3.97	0.91	20.0	40.9
3	31	0.245	0.218	0.257	0.286	0.174	0.094	0.470	0.470	0.470	0.376	0.0	0.0	334.16	1.88	2.85	0.95	21.7	42.0
TOTALS												0.0	0.0		30.0	52.2			

KSU MODEL 6 FOR WHEAT CF 1976-76

		THETA VALUES					TRANSPIRATION												
MO	DY	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYEP 5	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	RNOFF	DRAIN	THETA	TRANS EVAP	TOT.-- EVAP	KS	DEPL.	DEPL.
		0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	(MM)	(MM)	0-150 CM	(MM)	(MM)		0-90 CM	0-150 CM
4	1	0.208	0.215	0.254	0.284	0.173	0.168	0.840	0.840	0.840	0.672	0.0	0.0	329.37	3.36	5.01	0.93	24.8	44.0
4	2	0.171	0.211	0.251	0.281	0.173	0.176	0.880	0.880	0.880	0.704	0.0	0.0	324.38	3.52	5.23	0.90	27.9	46.1
4	3	0.138	0.208	0.249	0.278	0.172	0.157	0.787	0.787	0.787	0.629	0.0	0.0	319.98	3.15	4.61	0.86	30.7	47.9
4	4	0.134	0.207	0.248	0.278	0.172	0.021	0.103	0.103	0.103	0.083	0.0	0.0	319.40	0.41	0.60	0.83	31.0	48.2
4	5	0.107	0.204	0.246	0.275	0.171	0.0	0.952	0.794	0.794	0.635	0.0	0.0	315.07	3.17	4.55	0.83	33.7	50.0
4	6	0.100	0.197	0.243	0.273	0.170	0.0	0.840	0.700	0.700	0.560	0.0	0.0	311.26	2.80	3.99	0.80	36.1	51.6
4	7	0.100	0.197	0.243	0.273	0.170	0.0	0.0	0.0	0.0	0.0	0.0	0.0	311.26	0.0	0.0	0.0	36.1	51.6
4	8	0.304	0.196	0.243	0.272	0.170	0.021	0.105	0.105	0.105	0.084	0.0	0.0	321.11	0.42	0.58	0.78	29.2	47.5
4	9	0.280	0.193	0.240	0.270	0.170	0.164	0.819	0.819	0.819	0.655	0.0	0.0	317.00	3.28	4.32	0.84	31.8	49.2
4	10	0.266	0.190	0.238	0.267	0.169	0.147	0.737	0.737	0.737	0.589	0.0	0.0	313.67	2.95	3.83	0.81	33.8	50.6
4	11	0.265	0.190	0.238	0.267	0.169	0.006	0.028	0.028	0.028	0.022	0.0	0.0	313.53	0.11	0.14	0.79	33.9	50.6
4	12	0.242	0.187	0.235	0.264	0.168	0.173	0.866	0.866	0.866	0.692	0.0	0.0	309.32	3.46	4.44	0.79	36.5	52.4
4	13	0.225	0.184	0.233	0.262	0.168	0.125	0.626	0.626	0.626	0.500	0.0	0.0	306.28	2.50	3.20	0.76	38.4	53.6
4	14	0.207	0.181	0.230	0.260	0.167	0.139	0.697	0.697	0.697	0.558	0.0	0.0	302.91	2.79	3.56	0.74	40.5	55.0
4	15	0.292	0.180	0.229	0.258	0.167	0.083	0.417	0.417	0.417	0.334	0.0	0.0	305.70	1.67	2.13	0.72	38.4	53.9
4	16	0.477	0.299	0.226	0.255	0.166	0.184	0.921	0.921	0.921	0.737	7.17	0.0	342.43	3.69	4.64	0.74	12.5	38.6
4	17	0.500	0.336	0.226	0.255	0.166	0.0	0.0	0.0	0.0	0.0	0.0	0.0	352.83	0.0	0.0	0.0	5.3	34.2
4	18	0.481	0.332	0.223	0.252	0.165	0.203	1.015	1.015	1.015	0.812	0.0	0.0	348.30	4.06	4.79	1.00	8.1	36.1
4	19	0.271	0.324	0.254	0.248	0.164	0.214	1.068	1.068	1.066	0.855	0.0	0.0	343.56	4.27	5.03	1.00	11.0	38.1
4	20	0.491	0.360	0.252	0.247	0.164	0.102	0.508	0.508	0.508	0.406	0.0	0.0	362.41	2.03	2.39	0.99	-2.3	30.2
4	21	0.477	0.472	0.248	0.242	0.162	0.266	1.332	1.332	1.332	1.066	1.56	0.0	386.18	5.33	6.23	1.00	-19.3	20.3
4	22	0.457	0.467	0.244	0.238	0.161	0.224	1.118	1.118	1.118	0.895	0.0	0.0	381.26	4.47	5.22	1.00	-16.3	22.4
4	23	0.271	0.319	0.389	0.235	0.160	0.235	1.177	1.177	1.177	0.942	0.0	0.0	376.39	4.71	5.40	1.00	-13.3	24.4
4	24	0.393	0.319	0.389	0.234	0.160	0.004	0.019	0.019	0.019	0.015	0.0	0.0	382.41	0.07	0.09	1.00	-17.5	21.9
4	25	0.379	0.287	0.311	0.330	0.160	0.168	0.841	0.841	0.841	0.673	0.0	0.0	378.75	3.36	3.69	1.00	-15.3	23.4
4	26	0.286	0.304	0.310	0.330	0.159	0.043	0.217	0.217	0.217	0.173	0.0	0.0	377.81	0.87	1.00	1.00	-14.7	23.8
4	27	0.286	0.304	0.290	0.310	0.173	0.0	0.0	0.0	0.0	0.0	0.0	0.0	373.85	0.0	0.0	0.0	-6.5	25.5
4	28	0.500	0.328	0.301	0.310	0.173	0.0	0.0	0.0	0.0	0.0	0.0	0.0	394.15	0.0	0.0	0.0	-20.6	17.0
4	29	0.485	0.326	0.298	0.287	0.178	0.189	0.944	0.944	0.944	0.755	0.0	0.0	388.33	3.77	4.33	1.00	-14.1	19.4
4	30	0.493	0.328	0.288	0.293	0.178	0.094	0.470	0.470	0.470	0.376	0.0	0.0	388.10	1.88	2.16	1.00	-14.1	19.5
TOTALS												8.7	0.0		72.1	91.4			

KSU MODEL 6 FOR WHEAT OF 1976-76

		THETA VALUES					TRANSPIRATION												
MO	DY	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	RNOFF	DRAIN	THETA	TRANS EVAP	TOT. EVAP	KS	DEPL.	DEPL.
		0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	(MM)	(MM)	0-150 CM	(MM)	(MM)		0-90 CM	0-150 CM
5	1	0.477	0.326	0.284	0.289	0.177	0.292	1.460	1.460	1.460	1.168	0.0	0.0	383.10	5.84	6.69	1.00	-11.1	21.6
5	2	0.454	0.320	0.279	0.234	0.175	0.301	1.505	1.505	1.505	1.204	0.0	0.0	376.61	6.02	6.89	1.00	-7.2	24.3
5	3	0.266	0.317	0.299	0.278	0.174	0.307	1.536	1.536	1.536	1.229	0.0	0.0	369.99	6.15	7.03	1.00	-3.2	27.1
5	4	0.242	0.310	0.293	0.273	0.173	0.317	1.587	1.587	1.587	1.270	0.0	0.0	363.15	6.35	7.26	1.00	1.0	29.9
5	5	0.236	0.288	0.306	0.275	0.172	0.076	0.379	0.379	0.379	0.303	0.0	0.0	361.52	1.52	1.74	1.00	2.0	30.6
5	6	0.479	0.386	0.301	0.271	0.171	0.263	1.315	1.315	1.315	1.052	6.00	0.0	394.82	5.26	6.05	1.00	-21.6	16.7
5	7	0.454	0.380	0.285	0.277	0.170	0.298	1.492	1.492	1.492	1.194	0.0	0.0	388.31	5.97	6.91	1.00	-17.7	19.5
5	8	0.263	0.316	0.355	0.272	0.168	0.317	1.584	1.584	1.584	1.267	0.0	0.0	381.35	6.34	7.38	1.00	-13.4	22.4
5	9	0.252	0.314	0.353	0.270	0.168	0.128	0.638	0.638	0.638	0.510	0.0	0.0	378.53	2.55	2.99	1.00	-11.7	23.5
5	10	0.234	0.285	0.306	0.328	0.167	0.261	1.306	1.306	1.306	1.045	0.0	0.0	373.02	5.23	6.16	1.00	-8.3	25.8
5	11	0.200	0.277	0.299	0.322	0.165	0.382	1.912	1.912	1.912	1.530	0.0	0.0	364.58	7.65	8.95	1.00	-3.2	29.3
5	12	0.337	0.275	0.288	0.297	0.175	0.108	0.540	0.540	0.540	0.432	0.0	0.0	366.36	2.16	2.58	1.00	-0.2	28.6
5	13	0.325	0.272	0.286	0.295	0.175	0.124	0.622	0.622	0.622	0.498	0.0	0.0	363.53	2.49	3.00	1.00	1.5	29.8
5	14	0.358	0.275	0.282	0.286	0.175	0.228	1.141	1.141	1.141	0.913	0.0	0.0	362.36	4.57	5.54	1.00	2.7	30.3
5	15	0.358	0.275	0.282	0.286	0.175	0.0	0.0	0.0	0.0	0.0	0.0	0.0	362.36	0.0	0.0	0.0	2.7	30.3
5	16	0.285	0.288	0.282	0.285	0.175	0.042	0.211	0.211	0.211	0.169	0.0	0.0	361.37	0.84	1.04	1.00	3.3	30.7
5	17	0.247	0.281	0.276	0.280	0.174	0.325	1.624	1.624	1.624	1.299	0.0	0.0	353.72	6.50	8.08	1.00	8.0	33.9
5	18	0.207	0.275	0.271	0.275	0.172	0.326	1.628	1.628	1.628	1.303	0.0	0.0	345.97	6.51	8.18	1.00	12.8	37.1
5	19	0.163	0.267	0.265	0.268	0.171	0.377	1.883	1.883	1.883	1.507	0.0	0.0	337.11	7.53	9.37	1.00	18.2	40.8
5	20	0.129	0.260	0.259	0.263	0.169	0.0	1.881	1.568	1.568	1.254	0.0	0.0	329.56	6.27	7.96	0.95	22.9	43.9
5	21	0.104	0.255	0.256	0.260	0.168	0.0	1.157	0.964	0.964	0.771	0.0	0.0	324.69	3.86	5.12	0.90	25.9	46.0
5	22	0.210	0.254	0.255	0.259	0.168	0.053	0.264	0.264	0.264	0.211	0.0	0.0	329.08	1.05	1.28	0.86	22.8	44.1
5	23	0.230	0.253	0.255	0.258	0.168	0.036	0.178	0.178	0.178	0.142	0.0	0.0	329.46	0.71	0.97	0.89	22.4	44.0
5	24	0.259	0.252	0.254	0.258	0.168	0.041	0.207	0.207	0.207	0.166	0.0	0.0	330.17	0.83	1.15	0.90	21.9	43.7
5	25	0.257	0.249	0.251	0.255	0.167	0.177	0.885	0.885	0.885	0.708	0.0	0.0	326.96	3.54	4.95	0.90	23.8	45.0
5	26	0.333	0.249	0.251	0.255	0.167	0.0	0.0	0.0	0.0	0.0	0.0	0.0	330.76	0.0	0.0	0.0	21.1	43.4
5	27	0.401	0.245	0.248	0.252	0.166	0.198	0.990	0.990	0.990	0.792	0.0	0.0	330.62	3.96	5.70	0.91	20.8	43.5
5	28	0.345	0.239	0.243	0.247	0.165	0.271	1.353	1.353	1.353	1.082	0.0	0.0	323.07	5.41	7.91	0.90	25.6	46.6
5	29	0.248	0.247	0.240	0.244	0.164	0.184	0.918	0.918	0.918	0.734	0.0	0.0	317.75	3.67	5.57	0.85	28.9	48.9
5	30	0.476	0.245	0.239	0.243	0.164	0.081	0.403	0.403	0.403	0.323	0.0	0.0	327.73	1.61	2.53	0.82	21.9	44.7
5	31	0.433	0.242	0.236	0.240	0.163	0.180	0.901	0.901	0.901	0.721	0.0	0.0	322.36	3.60	5.60	0.88	25.3	46.9
TOTALS												6.0	0.0		124.0	154.6			

KSU MODEL 6 FOR WHEAT OF 1976-76

		THETA VALUES					TRANSPIRATION													
MO	DY	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	RNOFF	DRAIN	THETA	TRANS EVAP	TOT. EVAP	KS	DEPL.	DEPL.
		0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	(MM)	(MM)	0-150 CM	(MM)	(MM)		0-90 CM	0-150 CM
6	1	0.232	0.262	0.231	0.240	0.163	0.391	1.956	1.565	0.0	0.0	0.0	0.0	315.92	3.91	6.44	0.85	29.7	49.6
6	2	0.172	0.255	0.226	0.240	0.163	0.341	1.707	1.365	0.0	0.0	0.0	0.0	309.90	3.41	6.03	0.81	33.9	52.1
6	3	0.130	0.247	0.221	0.240	0.163	0.080	2.166	1.497	0.0	0.0	0.0	0.0	304.11	3.74	5.79	0.77	37.9	54.5
6	4	0.101	0.239	0.216	0.240	0.163	0.0	2.045	1.363	0.0	0.0	0.0	0.0	299.25	3.41	4.86	0.73	41.3	56.6
6	5	0.100	0.229	0.213	0.240	0.163	0.0	1.425	0.950	0.0	0.0	0.0	0.0	295.76	2.37	3.49	0.69	43.7	58.0
6	6	0.100	0.220	0.210	0.240	0.163	0.0	1.334	0.889	0.0	0.0	0.0	0.0	292.60	2.22	3.16	0.67	45.9	59.3
6	7	0.100	0.211	0.208	0.240	0.163	0.0	1.227	0.818	0.0	0.0	0.0	0.0	289.73	2.05	2.87	0.65	47.9	60.5
6	8	0.100	0.204	0.205	0.240	0.153	0.0	1.132	0.754	0.0	0.0	0.0	0.0	287.10	1.89	2.63	0.63	49.8	61.6
6	9	0.100	0.197	0.203	0.240	0.163	0.0	1.074	0.716	0.0	0.0	0.0	0.0	284.62	1.79	2.48	0.61	51.5	62.7
6	10	0.100	0.191	0.201	0.240	0.163	0.0	0.813	0.542	0.0	0.0	0.0	0.0	282.63	1.35	1.99	0.60	52.9	63.5
6	11	0.121	0.188	0.199	0.240	0.163	0.0	0.796	0.531	0.0	0.0	0.0	0.0	282.37	1.33	6.85	0.58	53.0	63.6
6	12	0.100	0.168	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	276.44	0.0	5.93	0.0	57.1	66.1
6	13	0.100	0.154	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	272.80	0.0	3.64	0.0	59.7	67.6
6	14	0.100	0.148	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	271.35	0.0	1.45	0.0	60.7	68.2
6	15	0.100	0.144	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	270.24	0.0	1.11	0.0	61.5	68.7
6	16	0.100	0.140	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	269.30	0.0	0.94	0.0	62.1	69.0
6	17	0.100	0.136	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	268.47	0.0	0.83	0.0	62.7	69.4
6	18	0.100	0.134	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	267.73	0.0	0.75	0.0	63.2	69.7
6	19	0.100	0.131	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	267.04	0.0	0.69	0.0	63.7	70.0
6	20	0.100	0.128	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	266.40	0.0	0.64	0.0	64.1	70.3
6	21	0.100	0.126	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	265.80	0.0	0.60	0.0	64.5	70.5
6	22	0.100	0.124	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	265.23	0.0	0.57	0.0	64.9	70.7
6	23	0.100	0.124	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	265.23	0.0	0.0	0.0	64.9	70.7
6	24	0.121	0.124	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	266.27	0.0	5.56	0.0	64.2	70.3
6	25	0.100	0.104	0.199	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	260.30	0.0	5.97	0.0	68.4	72.8
6	26	0.100	0.100	0.190	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	256.69	0.0	3.61	0.0	70.9	74.3
6	27	0.127	0.100	0.190	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	258.04	0.0	1.45	0.0	69.9	73.7
6	28	0.108	0.100	0.190	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	257.06	0.0	0.97	0.0	70.6	74.1
6	29	0.100	0.100	0.188	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	256.13	0.0	0.94	0.0	71.3	74.5
6	30	0.100	0.100	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	255.30	0.0	0.83	0.0	71.8	74.9
TOTALS												0.0	0.0		27.5	83.1			

KSU MODEL 6 FOR WHEAT OF 1976-76

		THETA VALUES					TRANSPIRATICN													
MO	DY	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5	RNOFF	DRAIN	THETA	TRANS EVAP	TOT. EVAP	KS	DEPL.	DEPL.
		0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	0-5 CM	5-30 CM	30-60 CM	60-90 CM	90-180 CM	(MM)	(MM)	0-150 CM	(MM)	(MM)		0-90 CM	0-150 CM
7	1	0.141	0.100	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	257.35	0.0	0.75	0.0	70.4	74.0
7	2	0.187	0.100	0.166	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	259.67	0.0	0.69	0.0	68.8	73.1
7	3	0.435	0.100	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	272.07	0.0	0.0	0.0	60.2	67.9
7	4	0.396	0.100	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	270.09	0.0	4.48	0.0	61.6	68.7
7	5	0.296	0.100	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	265.08	0.0	5.01	0.0	65.0	70.8
7	6	0.227	0.101	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	261.91	0.0	3.18	0.0	67.2	72.1
7	7	0.198	0.101	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	260.46	0.0	1.45	0.0	68.2	72.7
7	8	0.175	0.101	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	259.35	0.0	1.11	0.0	69.0	73.2
7	9	0.157	0.101	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	258.41	0.0	0.94	0.0	69.7	73.6
7	10	0.140	0.101	0.186	0.240	0.163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	257.58	0.0	0.83	0.0	70.2	73.9
TOTALS												0.0	0.0		0.0	18.4			

KSU MODEL 6 FOR WHEAT OF 1976-76

MONTH	POT. EVAP	SOIL EVAP	TRAN EVAP	A EVAP	TOTAL EVAP	RAIN (MM)	RATIO T/EO	TRAN EVAP(2)	TOT. EVAP(2)	RATIO T3/EO(2)	RATIO ET/EO(2)	RUNOFF	DRAINAGE
9	85.29	30.50	0.0	0.0	30.50	38.10	0.0	0.0	30.50	0.0	9.68	0.0	0.0
10	70.55	11.66	1.23	0.0	12.90	0.30	0.67	1.35	13.01	0.74	6.69	0.0	0.0
11	11.23	6.32	2.74	0.0	9.06	76.50	3.73	2.91	9.23	3.91	12.38	0.08	0.0
12	4.49	2.60	1.14	0.0	3.74	11.50	3.37	1.14	3.74	3.37	11.58	0.0	0.0
1	10.43	6.57	0.93	0.0	7.50	3.60	1.67	1.04	7.61	2.13	12.91	0.0	0.0
2	34.98	11.38	3.82	0.00	15.70	5.10	2.37	3.82	15.70	2.37	14.51	0.0	0.0
3	69.29	22.20	29.81	0.30	52.32	38.40	8.96	30.04	52.24	8.95	17.04	0.0	0.0
4	99.83	19.25	72.50	0.43	92.18	155.00	19.01	72.12	91.36	18.88	23.78	8.73	0.0
5	156.72	30.60	124.58	1.98	157.16	90.30	23.16	123.98	154.58	22.56	28.25	6.00	0.0
6	227.26	55.59	29.02	0.0	84.60	16.00	3.91	27.48	83.06	3.70	11.00	0.0	0.0
7	70.70	18.43	0.0	0.0	18.43	20.71	0.0	0.0	18.43	0.0	2.40	0.0	0.0
TOT.	840.77	215.60	265.76	2.72	484.07	455.51	66.84	263.87	479.47	66.59	150.23	14.80	0.0

BMTS MONTH	POT. EVAP	SOIL EVAP	TRAN EVAP	A EVAP	TOTAL EVAP	RAIN (MM)	RATIO T/EO	TRAN EVAP(2)	TOT. EVAP(2)	RATIO T3/EO(2)	RATIO ET/EO(2)	RATIO T3/T2(2)	POT TRAN(2)
PT -EM	14.89	3.20	0.0	0.0	3.20	1.50	0.0	0.0	30.50	0.0	9.68	0.0	0.0
EM -JT	251.95	73.39	71.05	0.31	144.74	146.10	28.78	72.22	145.61	29.57	86.28	121.21	80.69
JT -BT	116.19	16.28	99.29	1.12	116.69	190.90	20.59	99.06	115.33	20.35	23.71	23.45	101.04
BT -HD	28.42	5.36	23.06	0.0	28.42	12.00	4.90	23.06	28.42	4.90	6.00	6.00	23.06
HD -SD	143.41	35.17	72.36	1.29	108.82	38.30	12.58	69.53	104.70	11.77	17.36	18.36	84.75
SD -RP	75.44	15.97	0.0	0.0	15.97	0.0	0.0	0.0	15.97	0.0	1.85	0.0	0.0
RP->	140.07	38.93	0.0	0.0	38.93	30.11	0.0	0.0	38.93	0.0	5.37	0.0	0.0
TOT.	770.37	188.30	265.76	2.72	456.77	418.91	66.84	263.87	479.47	66.59	150.23	169.02	289.54

EMERGENCE DATE (BMTS=1.00 DAYS= 7)..10/ 1/75
JOINTING DATE (BMTS=2.36 DAYS=197)....4/15/76
BOOTING DATE (BMTS=2.70 DAYS= 27).... 5/12/76
HEADING DATE (BMTS=3.00 DAYS= 7).... 5/19/76
SOFT DOUGH DATE (BMTS=4.00 DAYS= 24). 6/12/76
RIPE DATE (BMTS=5.00 DAYS= 9)....... 6/21/76