

Irrigation Management Field Book

(Revised 2014)



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Irrigation Management Field Book



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FIELD # 1 INFORMATION

LEGAL LOCATION: _____

ACRES: _____ HECTARES: _____

CROP: _____

ROW WIDTH: _____ SPACING: _____

DATE SEEDED: _____ RATE: _____

FORAGE HARVEST RECORD

CUTTING	DATE	YIELD
FIRST		
SECOND		
THIRD		

FERTILIZER RECORD

TEST RESULTS	DATE	N	P	K	S
APPLICATIONS:					
DATE	ANALYSIS		RATE		

SPRAY RECORD

DATE	MATERIAL	RATE

FIELD # 1

IRRIGATION SYSTEM INFORMATION

POWER UNIT _____

PUMP MAKE _____ MODEL _____

NORMAL SPEED _____ RPM _____

IMPELLER SIZE _____ INCHES _____

PUMP DISCHARGE PRESSURE _____ PSI

SPRINKLER INFORMATION FOR PIVOTS

SYSTEM LENGTH _____ FEET

TOTAL SYSTEM FLOW _____ US GPM

END GUN FLOW _____ GPM AT _____ PSI

PRESSURE AT PIVOT POINT _____ PSI

PIVOT HOURS: SPRING _____ FALL _____

TYPE OF SPRINKLER PKG. _____

USE OF FLOW CONTROL NOZZLES? _____

USE OF PRESSURE REGULATORS? _____

SPRINKLER INFORMATION FOR SIDE ROLL

SYSTEM MODEL _____

NOZZLE SIZE _____ "X _____ " ON _____ SPRINKLERS

NOZZLE SIZE _____ "X _____ " ON _____ SPRINKLERS

DATE NOZZLES WERE REPLACED _____

NO. WITH FLOW CONTROL NOZZLES _____

NO. WITH PRESSURE REGULATORS _____

PRESSURE AT END SPRINKLER _____ PSI

NOTES ON SIDE ROLL SPRINKLERS _____

WATER APPLICATION INFORMATION

TOTAL SYSTEM FLOW _____ US GPM

AVG APPLICATION RATE _____ mm/HOUR (GROSS)

AVG APPLICATION RATE _____ mm/HOUR (NET)

NET APPLIC PER _____ HOUR SET = _____ mm

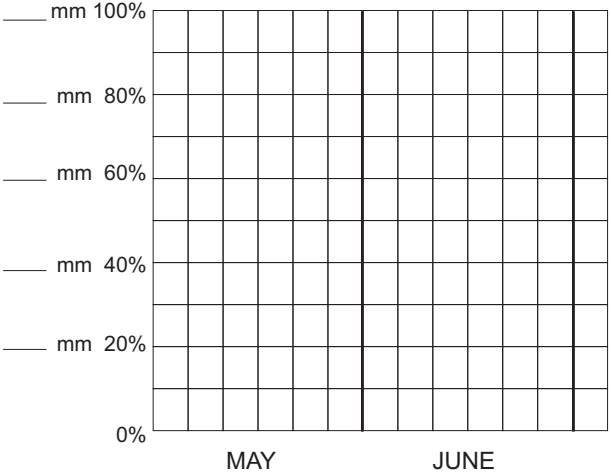
FIELD # 1 – PUMPING UNIT RECORD

DATE	TIME ON	TIME OFF	TOTAL HOURS	NOTES
SEASON TOTAL HOURS =				

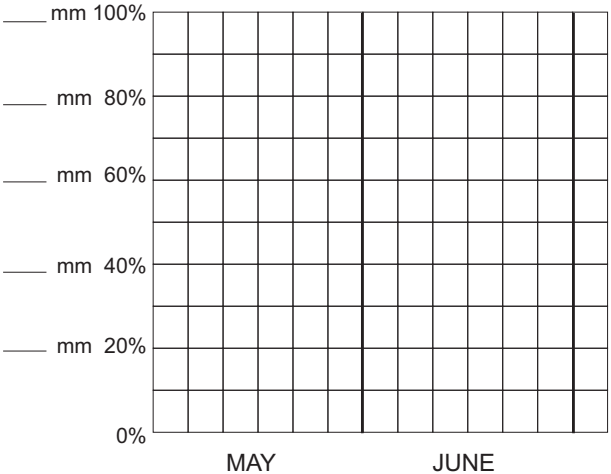
NOTES SHOULD INCLUDE MAINTENANCE
OVERHAULS, SHUTDOWN, ETC.

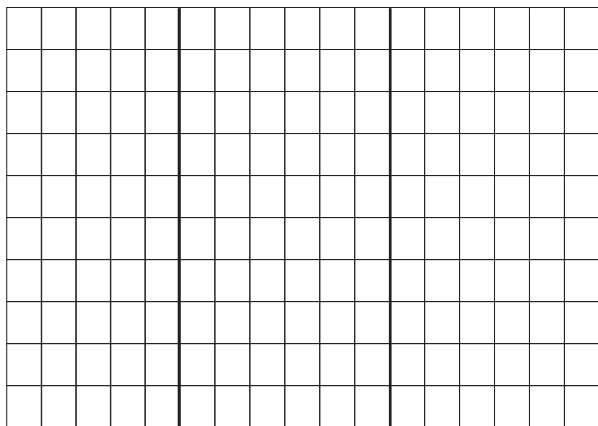
FIELD # 1 – AVAILABLE MOISTURE LEVEL

Key Root Zone (upper 0.5 metre) AD _____ % _____ mm



Entire Root Zone AD _____ % _____ mm

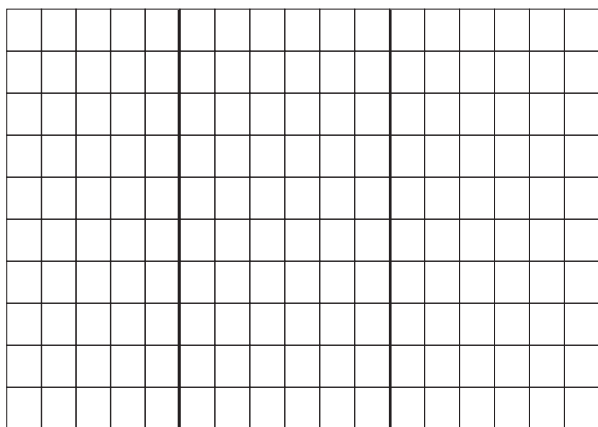




JULY

AUGUST

SEPTEMBER



JULY

AUGUST

SEPTEMBER

FIELD # 1 – RECORD OF MOISTURE APPLICATIONS

	MAY		JUNE		
	RAIN	IRRIG.	RAIN	IRRIG.	
1					1
2					2
3					3
4					4
5					5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
TOTALS	_____		_____		

FIELD # 2 INFORMATION

LEGAL LOCATION: _____

ACRES: _____ HECTARES: _____

CROP: _____

ROW WIDTH: _____ SPACING: _____

DATE SEEDED: _____ RATE: _____

FORAGE HARVEST RECORD

CUTTING	DATE	YIELD
FIRST		
SECOND		
THIRD		

FERTILIZER RECORD

TEST RESULTS	DATE	N	P	K	S
APPLICATIONS:					
DATE	ANALYSIS		RATE		

SPRAY RECORD

DATE	MATERIAL	RATE

FIELD # 2

IRRIGATION SYSTEM INFORMATION

POWER UNIT _____

PUMP MAKE _____ MODEL _____

NORMAL SPEED _____ RPM _____

IMPELLER SIZE _____ INCHES _____

PUMP DISCHARGE PRESSURE _____ PSI

SPRINKLER INFORMATION FOR PIVOTS

SYSTEM LENGTH _____ FEET

TOTAL SYSTEM FLOW _____ US GPM

END GUN FLOW _____ GPM AT _____ PSI

PRESSURE AT PIVOT POINT _____ PSI

PIVOT HOURS: SPRING _____ FALL _____

TYPE OF SPRINKLER PKG. _____

USE OF FLOW CONTROL NOZZLES? _____

USE OF PRESSURE REGULATORS? _____

SPRINKLER INFORMATION FOR SIDE ROLL

SYSTEM MODEL _____

NOZZLE SIZE _____ "X _____ " ON _____ SPRINKLERS

NOZZLE SIZE _____ "X _____ " ON _____ SPRINKLERS

DATE NOZZLES WERE REPLACED _____

NO. WITH FLOW CONTROL NOZZLES _____

NO. WITH PRESSURE REGULATORS _____

PRESSURE AT END SPRINKLER _____ PSI

NOTES ON SIDE ROLL SPRINKLERS _____

WATER APPLICATION INFORMATION

TOTAL SYSTEM FLOW _____ US GPM

AVG APPLICATION RATE _____ mm/HOUR (GROSS)

AVG APPLICATION RATE _____ mm/HOUR (NET)

NET APPLIC PER _____ HOUR SET = _____ mm

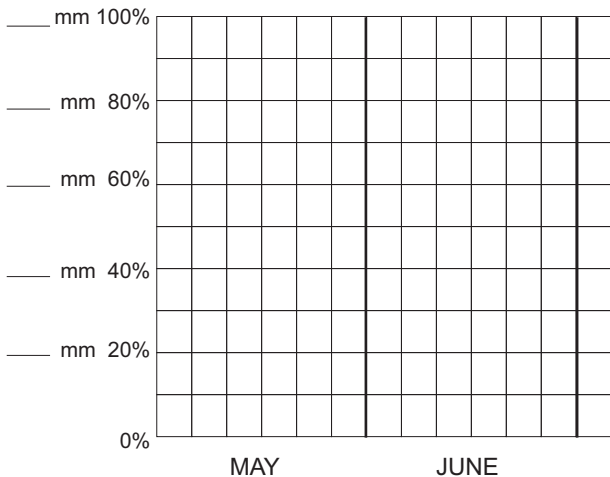
FIELD # 2 – PUMPING UNIT RECORD

DATE	TIME ON	TIME OFF	TOTAL HOURS	NOTES
SEASON TOTAL HOURS =				

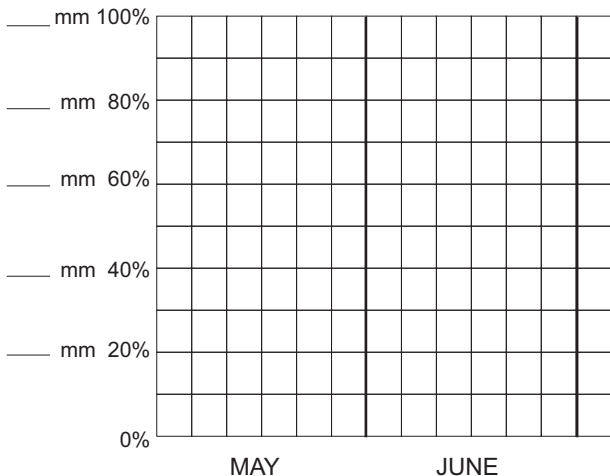
NOTES SHOULD INCLUDE MAINTENANCE OVERHAULS, SHUTDOWN, ETC.

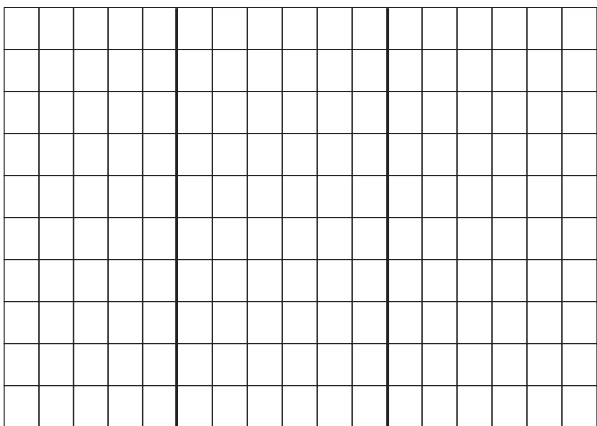
FIELD # 2 – AVAILABLE MOISTURE LEVEL

Key Root Zone (upper 0.5 metre) AD _____ % _____ mm



Entire Root Zone AD _____ % _____ mm

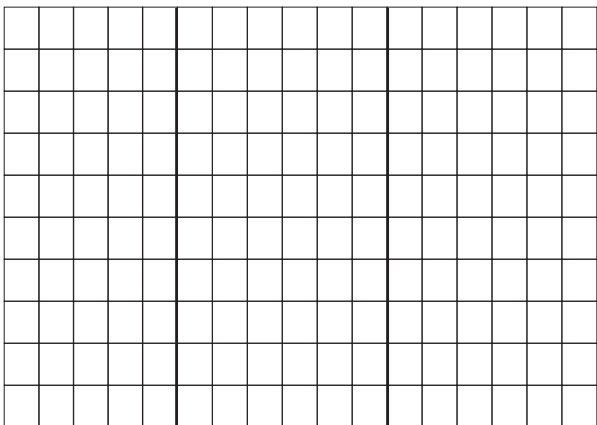




JULY

AUGUST

SEPTEMBER



JULY

AUGUST

SEPTEMBER

FIELD # 2 – RECORD OF MOISTURE APPLICATIONS

		MAY		JUNE			
		RAIN	IRRIG.	RAIN	IRRIG.		
1							1
2							2
3							3
4							4
5							5
6							6
7							7
8							8
9							9
10							10
11							11
12							12
13							13
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20							20
21							21
22							22
23							23
24							24
25							25
26							26
27							27
28							28
29							29
30							30
31							31
TOTALS		_____		_____			

FIELD # 3 INFORMATION

LEGAL LOCATION: _____

ACRES: _____ HECTARES: _____

CROP: _____

ROW WIDTH: _____ SPACING: _____

DATE SEEDED: _____ RATE: _____

FORAGE HARVEST RECORD

CUTTING	DATE	YIELD
FIRST		
SECOND		
THIRD		

FERTILIZER RECORD

TEST RESULTS	DATE	N	P	K	S
APPLICATIONS:					
DATE	ANALYSIS		RATE		

SPRAY RECORD

DATE	MATERIAL	RATE

FIELD # 3

IRRIGATION SYSTEM INFORMATION

POWER UNIT _____

PUMP MAKE _____ MODEL _____

NORMAL SPEED _____ RPM _____

IMPELLER SIZE _____ INCHES _____

PUMP DISCHARGE PRESSURE _____ PSI

SPRINKLER INFORMATION FOR PIVOTS

SYSTEM LENGTH _____ FEET

TOTAL SYSTEM FLOW _____ US GPM

END GUN FLOW _____ GPM AT _____ PSI

PRESSURE AT PIVOT POINT _____ PSI

PIVOT HOURS: SPRING _____ FALL _____

TYPE OF SPRINKLER PKG. _____

USE OF FLOW CONTROL NOZZLES? _____

USE OF PRESSURE REGULATORS? _____

SPRINKLER INFORMATION FOR SIDE ROLL

SYSTEM MODEL _____

NOZZLE SIZE _____ "X _____ " ON _____ SPRINKLERS

NOZZLE SIZE _____ "X _____ " ON _____ SPRINKLERS

DATE NOZZLES WERE REPLACED _____

NO. WITH FLOW CONTROL NOZZLES _____

NO. WITH PRESSURE REGULATORS _____

PRESSURE AT END SPRINKLER _____ PSI

NOTES ON SIDE ROLL SPRINKLERS _____

WATER APPLICATION INFORMATION

TOTAL SYSTEM FLOW _____ US GPM

AVG APPLICATION RATE _____ mm/HOUR (GROSS)

AVG APPLICATION RATE _____ mm/HOUR (NET)

NET APPLIC PER _____ HOUR SET = _____ mm

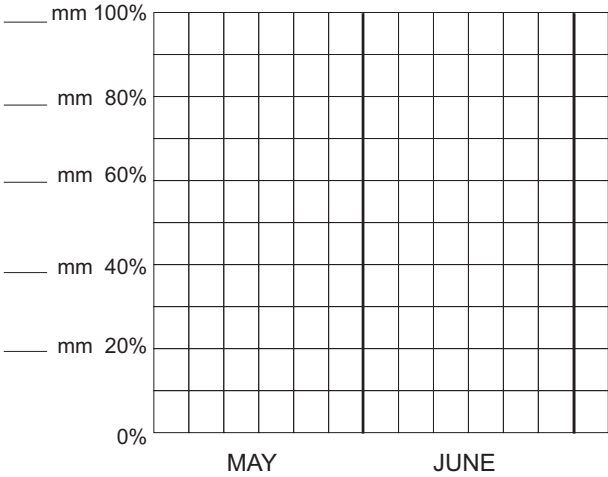
FIELD # 3 – PUMPING UNIT RECORD

DATE	TIME ON	TIME OFF	TOTAL HOURS	NOTES
SEASON TOTAL HOURS =				

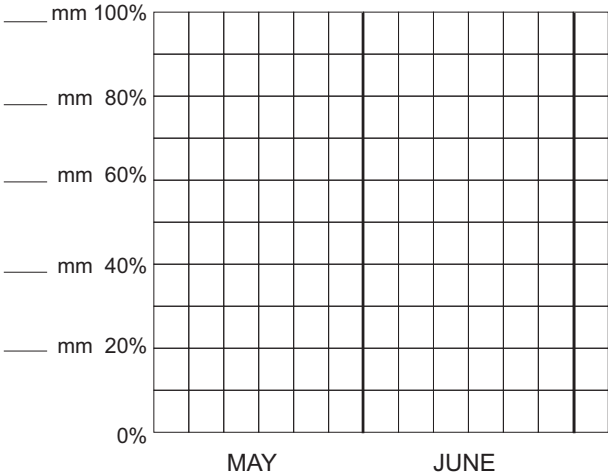
NOTES SHOULD INCLUDE MAINTENANCE OVERHAULS, SHUTDOWN, ETC.

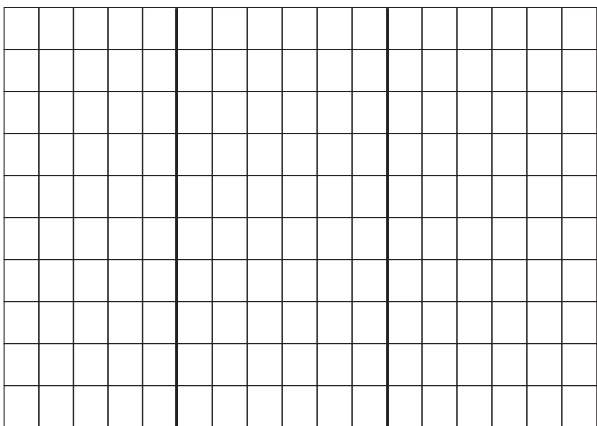
FIELD # 3 – AVAILABLE MOISTURE LEVEL

Key Root Zone (upper 0.5 metre) AD _____ % _____ mm



Entire Root Zone AD _____ % _____ mm

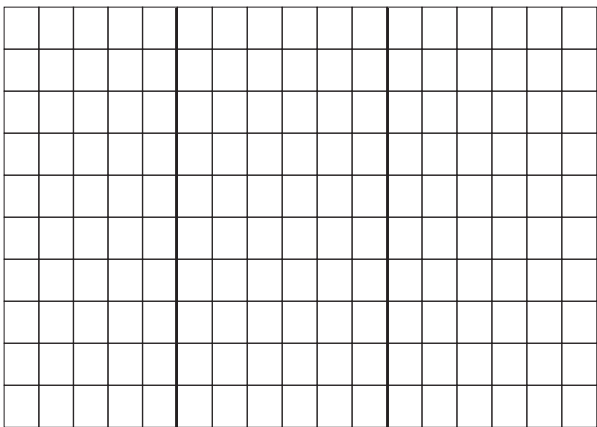




JULY

AUGUST

SEPTEMBER



JULY

AUGUST

SEPTEMBER

FIELD # 3 – RECORD OF MOISTURE APPLICATIONS

	MAY		JUNE		
	RAIN	IRRIG.	RAIN	IRRIG.	
1					1
2					2
3					3
4					4
5					5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
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19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
TOTALS	_____		_____		

JULY
RAIN IRRIG.AUGUST
RAIN IRRIG.SEPTMBER
RAIN IRRIG.

					1
					2
					3
					4
					5
					6
					7
					8
					9
					10
					11
					12
					13
					14
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					25
					26
					27
					28
					29
					30
					31

PRACTICAL INTERPRETATION CHART

		FEEL OR APPEARANCE OF SOILS	
		PERCENT OF AVAILABLE MOISTURE REMAINING	COARSE TEXTURE (SANDY LOAM)
DO NOT IRRIGATE		100% (FIELD CAPACITY)	UPON SQUEEZING NO FREE WATER APPEARS ON SOIL BUT WET OUTLINE OF BALL IS LEFT ON HAND
		75 - 100%	FORMS A WEAK BALL, BREAKS EASILY, WILL NOT SLIDE
IRRIGATE SPECIAL CROPS		50 - 75%	TENDS TO BALL UNDER PRESSURE BUT SELDOM WILL HOLD TOGETHER
IRRIGATE		25 - 50%	STILL APPEARS TO BE DRY, WILL NOT FORM A BALL WITH PRESSURE
		0 - 25%	DRY, LOOSE, SINGLE-GRAINED FLOWS THROUGH FINGERS

BALL IS FORMED BY SQUEEZING A HANDFUL OF SOIL FIRMLY

FOR AVAILABLE SOIL MOISTURE

<p>MEDIUM TEXTURE (LOAM)</p>	<p>FINE TEXTURE (CLAY LOAM)</p>
<p>SAME AS SANDY LOAM</p>	<p>SAME AS SANDY LOAM</p>
<p>FORMS A BALL AND IS VERY PLIABLE; SLICKS READILY IF RELATIVELY HIGH IN CLAY</p>	<p>EASILY RIBBONS OUT BETWEEN FINGERS HAS A SLICK FEELING</p>
<p>FORMS A BALL; SOMEWHAT PLASTIC; WILL SOMETIMES SLICK SLIGHTLY WITH PRESSURE</p>	<p>FORMS A BALL WILL RIBBON OUT BETWEEN THUMB AND FOREFINGER</p>
<p>SOMEWHAT CRUMBLY, BUT WILL HOLD TOGETHER FROM PRESSURE</p>	<p>SOMEWHAT PLIABLE WILL FORM A BALL UNDER PRESSURE</p>
<p>POWDER DRY, SOMETIMES SLIGHTLY CRUSTED BUT EASILY BREAKS DOWN INTO POWDERY CONDITION</p>	<p>HARD, BAKED, CRACKED, SOMETIMES HAS LOOSE CRUMBS ON SURFACE</p>

PLANT AVAILABLE WATER DETERMINATION

	TOTAL A.M. 1 m RZ (mm)	PERCENT AVAILABLE MOISTURE					
		100	80	60	50	40	20
LOAMY SAND	100	25	20	15	13	10	5
SANDY LOAM	140	35	28	21	18	14	7
LOAM	180	45	36	27	23	18	9
SANDY CLAY LOAM	160	40	32	24	20	16	8
SILT LOAM	200	50	40	30	25	20	10
CLAY LOAM	200	50	40	30	25	20	10
SILTY CLAY LOAM	220	55	44	33	28	22	11
SANDY CLAY	170	43	34	26	21	17	9
SILTY CLAY	210	53	42	32	26	21	11
CLAY	190	48	38	29	24	19	10

THIS TABLE IS USED TO DETERMINE THE WATER HOLDING CAPACITY OF A ROOT ZONE. UNITS ARE mm OF WATER PER 0.25 METRES OF SOIL.

EXAMPLE:

0.5 METRES OF LOAM OVER
0.5 METRES OF CLAY LOAM

$$\text{LOAM } 45 \text{ mm} \times 2 = 90 \text{ mm}/0.5 \text{ m}$$

$$\text{CLAY LOAM } 50 \text{ mm} \times 2 = 100 \text{ mm}/0.5 \text{ m}$$

$$\text{TOTAL FOR ROOT ZONE} = 190 \text{ mm} / 1 \text{ m}$$

NO SIGNIFICANT YIELD REDUCTION OF COMMON CROPS WILL OCCUR IF SOIL MOISTURE IS MAINTAINED ABOVE 50% OF AVAILABLE MOISTURE.

CALCULATION OF AVAILABLE MOISTURE:

FIELD # 1	TEXTURE	mm OF WATER AT 100% OF AVAIL. MOIST.
TOP 0.25 m		
2nd 0.25 m		
3rd 0.25 m		
4th 0.25 m		
5th 0.25 m		

TOTAL _____**FIELD # 2**

TOP 0.25 m		
2nd 0.25 m		
3rd 0.25 m		
4th 0.25 m		
5th 0.25 m		

TOTAL _____**FIELD # 3**

TOP 0.25 m		
2nd 0.25 m		
3rd 0.25 m		
4th 0.25 m		
5th 0.25 m		

TOTAL _____

IRRIGATED CROP INFORMATION

(Based on an 80% Probability Level of
Agro-Climatic Conditions)

CROP	TYPE	MAXIMUM WATER USE (10 DAY AVG.) mm/DAY
ALFALFA	FORAGE	7.6
	SEED	7.6
BARLEY	GRAIN	7.2
	MALT	7.2
	SILAGE	7.2
DRY BEANS	ALL	5.7
CANOLA	ARGENTINE	7.7
	POLISH	7.7
CORN	ALL TYPES	6.1
FLAX		7.1
DRY PEAS		6.2
POTATOES		6.2
SUGAR BEETS		6.0
SUNFLOWERS		6.6
WHEAT	SPRING	7.4
	DURUM	7.4
	SOFT	7.4
	CPS	7.4

SEASONAL WATER USE (mm)	MANAGEMENT ALLOWABLE DEPLETION (% OF AVAILABLE MOISTURE)	EFFECTIVE ROOTING DEPTH (m)
680	50	1.25
400	50	2.0
390	40	1.0
430	40	1.0
370	40	1.0
380	40	1.0
480	40	1.0
430	40	1.0
510	40	1.0
410	40	1.0
400	40	0.75
550	35	0.75
560	40	1.0
510	40	1.0
460	40	1.0
460	40	1.0
480	40	1.0
460	40	1.0

AVERAGE DAILY EVAPOTRANSPIRATION
FOR IRRIGATED CROPS
(APPROXIMATE AVERAGES
FOR 10 DAY PERIODS)
mm per DAY

	MAY		JUNE		
	11-20	21-31	1-10	11-20	21-30
ALFALFA	4.3	5.5	6.5	7.1	7.4
CORN	1.0	1.3	1.8	2.5	3.4
GRASS	3.4	4.3	5.1	5.9	6.5
SUGAR BEETS	1.4	2.0	2.7	3.7	4.4
WHEAT	1.2	1.9	3.4	5.1	6.7
POTATOES	1.4	2.2	3.0	3.8	4.6
CANOLA	1.1	1.7	3.2	4.9	6.5
BARLEY	1.1	2.2	4.2	6.0	7.1
FLAX	1.1	1.5	2.5	4.0	5.5
PEAS	1.4	2.3	3.5	4.5	5.4
DRY BEANS	–	–	2.0	2.9	3.8
SUNFLOWERS	1.0	3.0	4.6	5.6	6.3

SHADED AREA INDICATES 30 DAYS OF HIGHEST
MOISTURE USE. VARIATION WILL OCCUR DUE
TO CLIMATIC VARIABILITY AND CROP STAGE.

JULY			AUGUST			SEPT.		
1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20	21-30
7.6	7.5	7.3	6.9	6.3	5.6	4.9	3.9	–
4.8	5.0	5.7	6.1	6.0	5.4	4.4	3.3	–
6.9	7.2	7.1	6.7	6.2	5.3	4.2	2.8	–
4.9	5.4	5.9	6.0	5.9	5.5	4.5	3.8	3.0
7.4	7.3	6.4	4.9	3.4	–	–	–	–
5.3	5.8	6.2	6.2	5.8	4.9	3.6	2.6	–
7.4	7.7	7.1	6.0	4.4	–	–	–	–
7.2	6.3	4.9	–	–	–	–	–	–
6.6	7.1	6.7	5.7	4.5	–	–	–	–
6.1	6.2	6.0	5.2	4.4	–	–	–	–
4.6	5.4	5.7	5.3	4.1	2.5	1.0	–	–
6.6	6.5	6.0	5.1	4.2	2.5	1.0	–	–

HOW TO DETERMINE SOIL MOISTURE RESERVES

1. USE THE FEEL METHOD ALONG WITH THE CHART ON PAGE 31 TO DETERMINE THE % OF AVAILABLE MOISTURE REMAINING. USE THIS INFORMATION TO FILL IN COLUMNS "A" AND "B" IN THE TABLE ON PAGE 40.
2. USE THE AVAILABLE MOISTURE TABLE ON PAGE 33 TO FIND THE mm OF WATER CURRENTLY IN THE SOIL. PUT THIS INFORMATION IN COLUMN "C."
3. TOTAL THE AMOUNT OF WATER CURRENTLY IN THE ROOT ZONE. PUT THIS FIGURE IN BLANK "D".
4. FIND THE AVAILABLE WATER HOLDING CAPACITY OF THE ROOT ZONE. REFER TO PAGE 33 FOR INSTRUCTIONS. PLACE THIS FIGURE IN BLANK "E".
5. SINCE IT IS DESIRABLE TO MAINTAIN AT LEAST 50% OF AVAILABLE MOISTURE AT ALL TIMES, SUBTRACT $\frac{1}{2}$ OF "E" FROM "D". THE RESULTING FIGURE "F" IS THE AMOUNT OF WATER ABOVE 50%.

IF "F" IS BELOW ZERO, THERE ARE NO RESERVES. IRRIGATION SHOULD START IMMEDIATELY.
6. FIND THE AVERAGE CROP USE RATE ON PAGE 37. THIS IS FIGURE "G".
7. DIVIDE "F" BY "G" TO FIND THE NUMBER OF DAYS OF RESERVES REMAINING. AFTER THE EXPIRY OF THIS NUMBER OF DAYS, IRRIGATION SHOULD BE IN PROGRESS.

AVAILABLE WATER HOLDING CAPACITY _____ E
 AVAILABLE MOISTURE
 RESERVES ABOVE 50% = $D - (E \times 0.5) =$ _____ F
 OF AVAILABLE MOISTURE

AVERAGE OF CROP USE RATE (mm/DAY) _____ G
 DAYS OF RESERVES = $\frac{\text{_____ F}}{\text{_____ G}} =$ _____ days

FIELD# _____ DATE _____

COLUMN A

COLUMN B

COLUMN C

0.25 m zone	TEXTURE	% OF AVAIL. MOISTURE REMAINING	mm OF WATER AVAILABLE
TOP			
2nd			
3rd			
4th			
5th			
TOTAL mm OF WATER AVAILABLE _____			D

FIELD# _____ DATE _____

COLUMN A

COLUMN B

COLUMN C

0.25 m zone	TEXTURE	% OF AVAIL. MOISTURE REMAINING	mm OF WATER AVAILABLE
TOP			
2nd			
3rd			
4th			
5th			
TOTAL mm OF WATER AVAILABLE _____			D

FIELD# _____ DATE _____

COLUMN A

COLUMN B

COLUMN C

0.25 m zone	TEXTURE	% OF AVAIL. MOISTURE REMAINING	mm OF WATER AVAILABLE
TOP			
2nd			
3rd			
4th			
5th			
TOTAL mm OF WATER AVAILABLE _____			D

CONVERSION FACTORS

FLOW

1 LITRE/SECOND (L/s) = 15.85 US GPM

1 CUBIC FOOT PER SECOND (CFS) = 449 US GPM

1 ACRE-INCH PER HOUR = 454 US GPM

1 CUBIC METRE PER SECOND = 35.3 CFS

1 mm/day/ac = 0.74 US GPM/ac/day

HEAD OR PRESSURE

1 PSI = 2.31 FEET OF TOTAL DYNAMIC HEAD (TDH)

1 PSI = 6.89 KILOPASCALS = 0.70 METRES TDH

1 METRE OF TDH = 1.42 PSI

VOLUME

1 CUBIC FOOT = 6.23 IMP. GALLONS

1 CUBIC FOOT = 7.28 US GALLONS

1 ACRE-FOOT = 1,233 CUBIC METRES

1 AC-FT = 1.233 dam³

POWER & ENERGY

1 BRAKE HORSEPOWER = 0.746 KILOWATTS (1BHP = 0.746 kW)

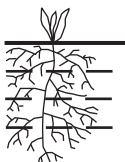
BHP REQUIRED = $\frac{\text{US GPM} \times \text{FEET OF TDH}}{3960 \times \text{PUMP EFF.}}$
TO PUMP

POWER (kW) = $\frac{\text{LITRES/SECOND} \times \text{METRES OF TDH}}{102 \times \text{PUMP EFF.}}$
REQ'D TO PUMP

NOTE: PUMP EFFICIENCY CAN BE OBTAINED FROM THE MANUFACTURER'S PUMP CURVE.

PUMP EFFICIENCY = $\frac{\text{PUMP OUTPUT}}{\text{POWER INPUT}}$

IN GENERAL CROPS OBTAIN WATER FROM THE ROOT ZONE IN THE FOLLOWING WAY:



40% FROM 1st 1/4 DEPTH

30% FROM 2nd 1/4 DEPTH

20% FROM 3rd 1/4 DEPTH

10% FROM 4th 1/4 DEPTH

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