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Sunflower-Safflower Irrigated Variety Trial 1976/77

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Introduction

In 1975/76 two varieties of sunflower, Hysun 10 and Hysun 20, as well as Safflower (Gila) were grown in a large alternative crop demonstration. Results were sufficiently good to warrant more and closer examination.

This led to the present variety trial using varieties suggested by Mr. M. Poole. The aim was to evaluate six sunflower varieties and one safflower.

The work was carried out in the light of reduced profitability of peas, beans and some fruit crops. This results in a number of growers having irrigation water and equipment under-employed. Other farmers are after a crop which will give them a decent profit. If high yields can be obtained consistently, sunflowers may provide an opportunity for farmers to make additional income.

Details

The trial was located on the Manjimup Research Station on a fairly steep slope but protected by a contour bank.

The soil type was a red sandy loam. The area had previously been planted with a potato crop followed in 1975/76 summer with a rape crop, prior to that the area had been in pasture.

The trial consisted of plots four metres wide and 24 metres long. These plots were trimmed back to 20 metres at harvest. There were seven varieties replicated four times, a total of 28 plots. The layout was in a randomized block design.

The varieties compared were, Hysun 30, Hysun 20, Hysun 10, VNIIMK, Sunfola, Polestar and Safflower (Gila).

The trial site was cultivated several times prior to applying a pre-plant application of treflan (1.8 l/ha) and incorporating it. Six hundred kilogram per hectare Superphosphate, one hundred and twenty kilogram Agran 34:0 and sixty kilogram muriate of potash per hectare were broadcast prior to planting.

The trial was drilled in at 35cm spacing on the 21st October. The plant population aimed for was about 100,000 however the drill used turned out to be un-reliable and gave seeding rates higher than desired. Despite calibrations for different varieties plant populations varied from 80,000 - 220,000 plants per hectare (APPENDIX II).

No irrigation was necessary until the first flower bud of the earliest variety, at which time one hundred and twenty kilogram Agran 34:0 and sixty kilogram muriate of potash per hectare were broadcast and watered in. This could be done commercially by applying the fertilizer through the sprinkler system.

The crop was watered regularly till the last plot was mature (when florets fell off the seed).

On the 30th March the trial was harvested by machine - being an ordinary all-crop harvester without trays, some seed was lost. At this time some of the early maturing varieties were very dry. A hand sample was also taken (APPENDIX II).

A 1.77 metre strip, 20 metres long was harvested. Samples were taken and dispatched for oil content analysis.

During the trial some records were kept of time of flowering and maturity.

Results Sunflower & Safflower Variety Trial 1976/77

NOTE: Yields kg per hectare @ 10% moisture, no dirt.

VARIETY	Replication				AVERAGE
	I	II	III	IV	
Hysun 30	3172.3	3302.2	2672.3	3118.6	3066.35
VNIIMK	2771.2	2822.0	3336.2	2875.7	2951.28
Sunfola	2776.8	2878.5	2632.8	3053.7	2835.45
Polestar	3158.2	2401.1	3217.5	2720.3	2874.28
Hysun 20	2438.7	2131.9	2951.9	2231.6	2438.53
Hysun 10	1652.5	1731.7	1861.7	2243.0	1872.22
Safflower	1663.9	1367.3	1573.5	1771.3	1594.00

Area of each plot 1.77 by 20 metres = 35.4 square metres.

grand mean = 2518.87

L.S.D's between treatments means p .05 = 435.02

Co-efficient of Variation = 11.58%

Results:

Days to 50% flower

	Rep IV	III	II	I	Ave
Sunfola	88	88	88	88	88
Polestar	81	81	88	86	84
Hysun 20	79	79	79	79	79
Hysun 10	74	74	74	74	74
Hysun 30	85	85	85	85	85
VNIIMK	86	81	86	86	85
Gila					

Days to 100% flower

Sunfola	103	103	103	103	103
Polestar	103	103	-109	103	104
Hysun 20	-88	-88	-88	-88	-88
Hysun 10	76	76	76	76	76
Hysun 30	88	88	88	88	88
VNIIMK	103	103	103	103	103
Gila	103	103	-109	103	104

Days to Maturity 100% Floret Drop

	Rep I	II	III	IV	Ave
Sunfola	152	150	150	155*	
Polestar	155	150	153	153*	
Hysun 20	130	130	130	130*	
Hysun 10	123	123	123	123	
Hysun 30	135	130	135	135*	
VNIIMK	150	145	145	135*	
Gila	155	155	155	155*	

*Partially estimates - figures not complete.

Oil Content %

	Rep I	II	III	IV	Ave
Hysun 20	44.79	44.79	45.97	44.13	44.96
Hysun 30	51.21	50.66	51.45	50.67	51.02
Polestar	33.98	35.60	33.88	35.14	34.65
Sunfola	49.06	47.41	49.16	49.48	48.78
Hysun 10	45.00	47.92	45.34	42.73	45.25
VNIIMK	48.29	47.88	48.07	47.55	47.95

Discussion:

From planting to harvest of the latest variety took 160 days the hybrid, Hysun 30 gave the highest yield at just over 3060 kg/ha just out yielding the open pollinated varieties VNIIMK 2951 kg/ha, followed by Sunfola at 2835 kg/ha and the premium birdseed variety Polestar at 2874 kg/ha. The two early maturing hybrids Hysun 20 and 10 gave low yields of 2438 and 1872 kg/ha respectively. Safflower only managed 1594 kg/ha.

The advantage of Hysun 30 lay not only in its higher yield but also in its earlier maturity and more importantly its more uniform maturity. This would allow earlier harvesting and at least one less irrigation.

The oil content is also some what higher (51%) than its nearest competitor (49%). There is one advantage in using VNIIMK and that is its seed availability and cheapness.

For birdseed purposes the variety polestar is preferred, and at the premium price and very good yield, would be very profitable. This seed is also readily available at a low price. It may require an extra irrigation as compared to Hysun 30.

Under irrigation the trial indicates that the varieties Hysun 10 and 20 are not worth growing unless water is limited since these have a lower requirement due to its shorter growing period.

Further work on alternatives to Hysun 30, VNIIMK and Sunfola will be carried out to determine the best variety for oil purposes. For birdseed - Polestar looks good, for oil Hysun 30.

After flowering a few malformed heads were apparent, This is one symptom of boron deficiency (Blamey, 1976.)

An economic analysis on the results is attached (APPENDIX I) and indicates that the birdseed market is the most profitable on these figures.

Summary

The trial compared six sunflower varieties and one safflower. Good yields of up to 3060 kg/ha were obtained.

Some flowering and maturity data was recorded.

An economic assessment shows that the birdseed variety at premium prices is way ahead but for oil seed purposes the open pollinated varieties are as good as hybrids (if no premium is paid for higher oil content and no allowance is made for less irrigation in a hybrid crop).

Acknowledgements

Mr. K. Rutter economist at the Bunbury office assisted with the economic assessment. He in turn was assisted by Mr. J. Middlemas in calculating the irrigation costs.

Mr. M. Poole provided seed supplies and general suggestions on the trial he also arranged oil content analysis.

R. Ramm, R. Trigwell for harvesting the plots and the Manjimup Research Station staff for looking after the crop.

Reference:-

- F.P.C. Blamey. Boron Nutrition of Sunflower (*Helianthus annuus* L.) on an Avalon medium sandy loam.
Agrochemophysica 8, 5-10 1976.

APPENDIX I

Economic Assessment of Sunflowers.

Irrigated Sunflower - Gross Margin Analysis

The following is a summary of the gross returns possible for irrigated sunflower. It is based on experimental data for both yield and operation expenses on a five hectare area.

Material Cost

<u>Item</u>	<u>Rate</u>	<u>Cost/Unit</u>	<u>Total Cost/5 ha</u>
1. Weedicide	1.8 l/ha	\$7.00/l	\$ 63
2. Fertilizer			
- Super	600 kg/ha	\$ 62/tonne	\$ 186
- Potash	120 kg/ha	\$122/tonne	\$ 73
- Nitrogen (Agron 34:0)	240 kg/ha	\$127/tonne	\$ 152
3. Seed			
VNIIMK, Polestar	8 kg/ha	\$0.65/kg	either \$ 26
Hybrids	8 kg/ha	\$3.50/kg	or \$ 140

Operations Costs (Tractor cost \$4.00/hr)

1. Ground Preparation 2 x Discings	1 hr/ha x 2		\$ 40.00
2. Weed Control Spraying Rotary Hoeing	0.25 hr/ha 1.00 hr/ha		\$ 25.00
3. Fertilizing	0.8 hr/ha		\$ 16.00
4. Seeding	0.5 hr/ha		\$ 10.00
5. Irrigating	1.Travel Irrigator(T.I.) 2.Hand move (H.M.) (APPENDIX III)	either or	\$1217.00 \$ 976.00
6. Harvesting costs	0.5 hr/ha	\$50/hr	\$ 125.00

Costs per 5 ha

	VNIIMK	Polestar (contract) Birdseed	HYBRID
Material Cost \$	500	500	614
Operating Cost \$			
T.I.	1433	1433	1433
H.M.	1192	1192	1192
Total Cost \$			
T.I.	1933	1933	2047
H.M.	1692	1692	1806
TOTAL RETURN \$	2500	4500	2600+
GROSS MARGIN			
T.I.	567	2567	553
H.M.	808	2808	794

These are only gross margins - they represent the return to labour. The two systems have different labour requirements. Please keep in mind that the time involved in moving the travelling irrigator is only about 5-6 hours per week. You could anticipate at least twice that for a hand move line and at more frequent intervals. The figures represent totals for five hectares.

Please note that the Irrigation costs are for an average situation - for individual growers these costs will differ.

Returns are based on yields of:-

2.5 t/ha @ \$200 per tonne for VNIIMK
2.4 t/ha @ \$375 per tonne for Polestar as birdseed contract.
2.6 t/ha @ \$200 per tonne for Hybrid (Hysun 30) - oilseed.

It is anticipated that since the hybrid has a higher oil content it could be paid a premium. Some cost savings in irrigation of the hybrid are also envisaged.

1976/77 Sunflower Variety - Irrigated Eri

Hand Sampled Yields and Plant Counts.

Rep 1 Rep 2 Rep 3 Rep 4
Kg/ha

	Plants	Yield	Plants	Yield	Plants	Yield	Plants	Yield	
Polestar	140000	5470.0	80000	3623.5	140000	5365.8	150000	2940.1	135,000 4599.8
VNIILK	120000	2604.8	130000	4546.2	200000	4128.0	220000	3461.5	167,500 3685.12
Sunfola	80000	3315.2	100000	4252.5	100000	4787.3	80000	2506.6	90,000 3715.4
Hysun 30	220000	6208.7	210000	3459.1	190000	3385.4	160000	3092.3	195,000 4035.62
Hysun 20	150000	3690.7	130000	2091.4	140000	3030.8	170000	3182.5	147,500 3000.35
Hysun 10	150000	3305.6	140000	2700.6	120000	2830.4	130000	3061.7	145,000 2974.62
		4099.2		3445.6		4088.2		3041.8	

Sunflower (Sample 1.00 m Squared)

APPENDIX II

IRRIGATION COST DETAILS

HAND MOVE

	5 ha	10 ha
<u>Capital</u>		
Main line	500	1 000
Laterals	1 200	1 200
Sprinklers up rights and fittings	500	500
Pump	500	500
Motor	2 500	2 500
TOTAL	5 200	5 700

Op. Costs (exc. labour per crop)

Fuel	356.00	712.00
Repairs	100.00	200.00
Replacement	520.00	570.00
TOTAL	976.00	1 482.00

TRAVELLING IRRIGATOR

Capital

Motor	2 500	2 500
Pump	300	300
Irrigator	1 700	1 700
Pipe	600	1 200
TOTAL	5 100	5 700

Op. Costs (exc labour)

Fuel	557.00	1 114.00
Repairs	150.00	200.00
Replacement	510.00	570.00
TOTAL	1 217.00	1 884.00