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Interim Summary 1974 Experiments

M.L. POOLE, PLANT RESEARCH DIVISION

Data presented for:

74MT38 - Variety Trial - New rape and radish varieties

74MT27 - Rates of seed, time of planting on *Crambe abyssinica*

74GE1 - Time of Seeding X Rate of Nitrogen on Sunflowers

Oilseed and Grain Legumes under Summer Irrigation

Sunflower Progress Report

Safflower Progress Report

Response of Oilseed Crops to Climate

INTRODUCTION

The results given in this report provide an interim record of 1974 experimental work with oilseed crops. An essential part of oilseed trial programme is an evaluation of the quantity and quality of oil produced by different species and varieties under a range of environmental conditions. These analyses take time. Full interpretation of the trials will only be possible when these data are available.

Trials on rape and Crambe at Wongan Hills Research Station failed due to Wimmera rye grass competition.

74MT38/

New Rape and Radish Variety Trial

Location: Mt Barker Research Station

Soil: Gravelly loam, high level, good cropping

History: Good subclover 1972-73

Aim: To compare yields of a number of new rape and radish introductions with a standard variety. A subsidiary aim was to bulk up seed of these varieties.

Details: Sown: 22.7.74. A new technique was used in seeding this trial. Only small amounts of seed were available, so it was ballasted with dead rapeseed (killed in autoclave) and hand topdressed onto plots. The seed was then covered with trailing peg harrows. This technique worked very well.

Fertiliser: Agran 24:24 127 kg/ha prior to seeding.

Layout: 6 treatments x 2 reps. Randomized blocks. Plots 25 m x 2.1 m

Insect Control: Routine DDT. Very good control

Weeds: Nil

Yields:

Variety	Rep. 1 gm/plot	Rep. 2 gm/plot	Total	kg/ha
Ramces*	-	-		
Primar*	-	-		
Major	2 855	2 535	5 390	5390
Narim 16	1 160	2 430	3 590	359
Target Seln	5 090	5 310	10 400	1 040
Radish SV 6863	2 875	2 200	5 075	507

* Winter habit - a few plants flowered and set seed.

Comments: The reselected Target was much superior to the other varieties. The yields were disappointing, the trial looked better than the yields indicate. The reason for this is not known.

74MT27/3286EX

Rates of Seed, Time of Planting on Crambe abyssinica

Location: Mt Barker Research Station

Soil: Gravelly loam, high level, good cropping

History: Good subclover 1972/73

Aim: To examine the effects of seeding rate and time of planting on the yield and oil content of Crambe abyssinica in the Mt Barker environment. High yield (2 000 kg/ha) in preliminary trials involving one seeding rate and planting time in 1972 and 1973 prompted this work.

Details: Times of planting: 1st 15.5.74
2nd 20.6.74
3rd 22.7.74

Fertilizer: Superphosphate 180 kg/ha; Amm. nitrate 100 kg/ha

Layout: Plots 2.1 x 60 m drill sown. Planting times as separate side by side blocks. 3 reps of seeding rate treatments within blocks.

Insect Control: Sprayed once with DDT 16 oz/ac

Weeds: Nil

<u>Seed:</u> Germination Test:	Germination	35%
	Fresh ungerm.	5%
	Abnormal	4%
	Dead	55%

Plant Densities (plants/m²):

Area sampled: 30 cm x 18 cm quadrats

Dates Sampled:	1st Top	15.7.74	8 quadrats/plot
	2nd Top	22.7.74	10 quadrats/plot
	3rd Top	12.8.74	8 quadrats/plot

Treatment	Rep. 1	Rep. 2	Rep. 3	Total	Plants/m ²
May Planting					
1. 20 kg/ha	33	31	48	112	86
2. 40 "	48	51	62	162	124
3. 60 "	94	75	75	244	188
4. 80 "	78	52	87	217	167
5. 100 "	104	120	135	359	276
June Planting					
6. 20 kg/ha	51	64	61	176	108
7. 40 "	82	120	121	323	199
8. 60 "	141	147	132	420	259
9. 80 "	131	135	125	391	241
10. 100 "	199	220	187	606	373
July Planting					
11. 20 kg/ha	41	29	32	102	78
12. 40 "			NOT SOWN		
13. 60 "	62	64	52	178	137
14. 80 "	53	60	67	180	138
15. 100 "	124	114	119	357	275

Flowering Dates:

	Date:	Days to Flower
1st Top	5. 9.74	113
2nd Top	10.10.74	112
3rd Top	25.10.74	95

Grain Yields: (kg/ha)

Time of Planting and Seeding Rate	Rep. 1 kg/plot	Rep. 2 kg/plot	Rep. 3 kg/plot	Total	kg/ha
May Planting					
1. 20 kg/ha	10.8	10.7	11.9	33.4	976
2. 40 "	10.8	11.1	16.0	37.9	1107
3. 60 "	11.2	8.1	12.9	33.2	970
4. 80 "	11.2	11.9	16.8	39.9	1166
5. 100 "	10.0	11.8	11.1	32.9	961
June Planting					
1. 20 kg/ha	24.4	27.2	26.6	78.2	2285
2. 40 "	25.0	26.7	27.2	78.9	2306
3. 60 "	25.1	26.0	26.5	77.6	2268
4. 80 "	25.0	27.6	28.2	80.8	2361
5. 100 "	23.4	24.5	23.8	71.7	2095
July Planting					
1. 20 kg/ha	14.3	16.0	18.0	48.3	1411
2. 40 "	-	-	-	-	-
3. 60 "	17.0	17.1	18.6	52.7	1540
4. 80 "	17.0	17.2	16.2	50.4	1473
5. 100 "	13.5	14.2	13.8	41.5	1213

Disease and Lodging:

This trial was very badly affected by Sclerotinia. All planting times were affected but the 1st Top was most severe. The disease was first noticed on the 1st Top in early October. From then it advanced very

quickly and much of the crop matured prematurely. The combined effect of heavy seeding rates and sclerotinia caused severe lodging of some treatments.

Estimates of sclerotinia infection were approximately 75% for 1st Top, 50% 2nd Top, 30% 3rd Top.

A nearby lupin (*L. angustifolius*) crop had about 20% infection with sclerotinia.

This crop appears ultra-sensitive to the disease.

Oil Contents: Test to be done. Anticipate low % due to premature drying off due to Sclerotinia.

Conclusions:

(1) Seeding Rate:

The range of rates chosen was poor. The literature suggested rates of 20-30 kg/ha. In view of the poor germination the range of rates used seemed appropriate. However, with the 35% germination in mind, it appears that a 10 kg/ha rate of good seed would be adequate.

(2) Yields:

Despite the severe sclerotinia, the yields from the June sowing are still very impressive. A final evaluation will not be possible until the oil content figures are available.

74GE1/3154EXTime of Seeding x Rate of Nitrogen on Sunflowers (Co-op. with M. Mason)

Location: Greenough

Soil: Grey calcareous sand

History: Medics, grass 1973

Aim: To obtain data on the effect of time of planting and nitrogen rate on the yield and oil content of sunflowers in this environment.

Details: Sown: 1st Top June
2nd Top Early August

Basal Fertilizer: Manganese Super 180 kg/haVariety & Seeding Rate: WN II MK 6450 at 7 kg/ha

Technique: Planted in 14" rows by blocking off every second run in grain box with masking tape. Fertiliser at 7" spacings.

Layout: Two planting time blocks. 9 treatments x 3 reps in randomized blocks.

Plant Density: A plant density of 13 plants/m² was obtained (130 000/ha)

Time of Flowering: 1st Top 7.10.74
2nd Top 31.10.74

Yields: (kg/ha)

Time of Planting and N Treatments	Rep. 1 gm/plot	Rep. 2 gm/plot	Rep. 3 gm/plot	Total	kg/ha
June Planting					
Nil	191	173	296	660	388
Urea 56 kg/ha immed after seeding	172	225	246	643	378
112	208	187	265	660	388
168	167	235	243	645	379
336	180	151	175	506	297
56 kg/ha 4 wks after seeding	184	246	198	628	369
112	157	251	240	648	381
168	179	228	208	615	361
336	223	230	201	654	384
August Planting					
Nil	265	243	200	708	416
Urea 56 kg/ha immed. after seeding	212	230	186	628	369
112	259	232	155	646	379
168	155	210	185	550	323
336	205	162	228	595	349
56 kg/ha after seeding	167	230	213	610	358
112	158	243	196	597	340
168	226	208	164	598	351
336	234	222	140	596	334

- Comments: 1) Plant density: The density of 130 000/ha obtained appeared too high. Many plants were spindly with small heads. Past work, and the literature would suggest a rate of 30 000-40 000. VN II MK 6450 is small seeded and establishment was very good, hence the high density.
- 2) Yields: Yields are low, with, surprisingly, no treatment differences. A small colour response to nitrogen was noted in late October inspection.
- 3) Health: The crop appeared very healthy, particularly in comparison with neighbouring lupins (chlorosis and death) and wheat crops.

Oilseed and Grain Legumes Under Summer Irrigation

Location: Old Coast Road, West Harvey, P. Rose

Soil: Deep yellow sand. Tuart.

History: Cleared several years. Rotation of lucerne and potatoes.
Potatoes 1973.

Aim: To gather preliminary information on the feasibility of growing a range of cereal, oilseed and grain legume crops under summer irrigation in this region.

Details: Sown: 11.10.74 into fine seed bed

Irrigated: every 10-14 days with "roller" sprinklers

Fertiliser: Superphosphate 180 kg/ha drilled)
180 kg/ha TD) at seeding

Amm. Nitrate: 200 kg/ha at seeding + 200 kg/ha at 5 weeks

KCl: 200 kg/ha at seeding + 200 kg/ha at 5 weeks

MnSO₄: 28 kg/ha at seeding.

Layout: Plots 2.1 x 40 m. Drill sown. 10 treats x 2 reps - randomized blocks.

Insect Control: Sprayed by farmer when spraying lucerne. Control excellent except for rape which was wiped out at week 4 by cabbage moth - completely destroyed in 5 days.

Harvesting: With MF31 header, except sunflower where two 3 m x plot width (2.1 m) quadrats taken per plot and hand threshed.

Treatments: Yields kg/ha

Crop and Seeding Rate	Rep. 1	Rep. 2	Mean
Hysun 30 Sunflower 10 kg/ha	5079	5825	5452
Gila Safflower 50 kg/ha	2120	1472	1796
Glenelg Linseed 50 kg/ha	568	728	648
Gamenya Wheat 60 kg/ha	789	1070	929
Buckwheat 30 kg/ha			poor
Uniharvest lupin 90 kg/ha	-	100	100
Unicrop Lupin 90 kg/ha	-	518	518
L. albus WB2 200 kg/ha	397	350	373
Ario Rape 4 kg/ha	-	-	failed - insects
Turret Rape 6 kg/ha	-	-	failed - insects

NB Oil contents not yet available.

Comments: Sunflower: Hyson 30 is a hybrid developed by Pacific Seeds utilizing cytoplasmic male sterility and restorer genes. It is short (1.5 m) thick-stemmed, approximately same maturity as Peredovik and does not show the spread of flowering time and maturity exhibited by open pollinated varieties. Its performance in this trial was outstanding. Follow up work is necessary and will be undertaken in 1975. The edge effect in the plots was large and yield under field conditions would have been of the order of 3 000 kg/ha plus.

Buckwheat: Flowered within 3 weeks of planting and set a small amount of seed. Not impressive.

Wheat: Never looked healthy. Approximately 25% of plants died, apparently due to root rot. Also appeared to suffer Mg deficiency. Sprinkler wash affected wheat more than other crops.

Unicrop: Matured quickly, small (60 cm) plants. Not impressive.

Uniharvest: Late flowering, probably due to lack of vernalization at the temperatures operating. Poor.

L. albus WB2. Matured quickly, plants short (50 cm)

Safflower: Looked best after sunflower, yielded well. Worth further work. Crop healthy, 1 m tall.

Linseed: Looked better than yields suggest. Density adequate. Reason for light yield unknown.

Rape: Completely destroyed by insects.

Conclusion: Results with Sunflower in particular and safflower were very promising and further work is necessary. The returns from sunflower compare more than favourably with lucerne hay and seed production.

The other crops were not impressive, considering the high fertiliser and capital inputs.

Sunflower Selection Programme

Results of trials at Geraldton, Lancelin and Mt Barker in recent years suggest that late July-August is a suitable sowing time for sunflower. Earlier sowing gives small plants with small heads, whilst later sowing, under dryland conditions gives too short a growing season. The Russian varieties used in these studies - Peredovik and VN II MK 6450 - are both fairly tall (2 m) and tend to lodge. It is my opinion that an earlier maturing shorter thick-stemmed type of even maturity would be better suited to dryland production in W.A. Preliminary selection work has been carried out for these characteristics. Lines which flower 2-3 weeks earlier than Peredovik have been selected. Earliness is achieved at the expense of leaf number, Peredovik having about 20-25 leaves under our conditions whilst the early selections flower at the 14-16th node. Short thick-stemmed types (1.3 m) have been selected which are of Peredovik maturity. An attempt will be made to combine these characteristics in 1975.

In parallel with this programme, all available Russian material in Australia which is earlier flowering than Peredovik has been gathered for comparison with Peredovik and the above material. About 12 lines are involved.

In co-operation with the other States, the USDA sunflower collection is being introduced into Australia. This must be done under strict quarantine and will take 5-6 years to import the complete collection. The introduction of 20 lines was commenced in 1974, in co-operation with Horticulture Division.

It is possible that the new varieties Hysun 30 and Hysun 10 which have been developed by Pacific Seeds may make a significant contribution. Hysun 30 appears to combine the desirable characteristics of shortness (1.2-1.5 m), thick stems and even maturity and has Peredovik maturity or slightly later. Hysun 10 should be about 10 days earlier than Peredovik. These are true hybrids based on cytoplasmic male sterility and restorer genes and show 20-25% heterosis. These hybrids are definitely worth testing under dryland conditions in 1975. In 1974 they were under preliminary test under irrigation. (Results elsewhere in this report).

Safflower

The existing cultivar Gila, although the earliest available, is too late for dryland safflower production in Western Australia. A small quantity of seed was treated with EMS (.067% and .2% EMS at 20°C for 24 hours) and planted out in 1974. The M₁ seed from this will be planted in 1975 and early plants selected. Chlorosis and distortion of the treated crop suggests successful dose rate of EMS.

Oilseed Crops Response to Environment

A number of oilseed crops are being tested in Western Australia and several have reached commercial or semi-commercial production. When introducing crops into a new environment it is necessary to gather information as quickly as possible on the response of these crops to climate. Information of this type allows one to predict, in a very crude way, the performance of these crops in environments where they have not been tried. It gives leads as to how the management techniques can be juggled to fit the crop more comfortably into a particular situation and suggests approaches which should be taken in breeding and selection work.

Much of this type of information has been gathered on these crops for the April to December period over the past few years. Many sites and few planting times have been used in previous years. In 1974 a detailed study of flowering time of *B. napus*, *B. campestris*, Safflower, Sunflower, linseed and Crambe was undertaken at one site (South Perth) and multiple planting times (every two weeks all year March 1 - March 1). The raw flowering time results are presented here; later an attempt will be made to quantify these in terms of photoperiod, vernalization and temperature responses so that extrapolation from the data to other parts of the State (and tomorrow the world!) is possible.

