



DEPARTMENT OF AGRICULTURE AND FISHERIES, SOUTH AUSTRALIA

Agronomy Branch Report

HARVESTING OF MEDIC SEED

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HARVESTING OF MEDIC SEED

A report on the measurement of harvest efficiency of a Horwood-Bagshaw clover harvester on a seed crop of Jemalong barrel medic at Mallala, 24 February, 1977.

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Aim of the Investigation:

To measure the quantities of material passing through a Horwood-Bagshaw clover harvester during a commercial seed harvesting operation.

Location and Crop:

A crop of Jemalong barrel medic being harvested for certified seed on the property of S.H. March and Son, Paddock C, Section 493, Hundred of Grace, County Gawler, was used.

Seed was sown at 15 kg/ha with barley in autumn 1975. The barley was reaped but no medic seed harvested. In 1976 the medic was allowed to regenerate and treated for seed crop production. Harvest of the seed crop began 16 February 1977.

The soil of the area is a red-brown earth of clay-loam surface texture.

Machinery:

The harvesting unit was a standard Horwood -Bagshaw suction clover harvester set for medic harvesting. Seed riddles were standard on top and 3.6mm bottom and thresher set as per makers recommendations with 3 mm gap between thresher bars and drum.

The power unit was a Chamberlain C670 tractor of 47 kW power at the P.T.O. with a fuel consumption of 9 l/hr. Harvestable area per hour was 0.34 ha.

Materials and Methods:

Samples were taken and measurements made of a number of parameters on the northern side of the paddock during three successive passes of the harvesting machine. These parameters were:-

- a) Meteorological conditions - temperature and relative humidity of the air using a Zeal whirling psychometer.
- b) Moisture content of plant material on the soil surface immediately prior to harvest and of the trash passed through the machine. Moisture content was determined gravimetrically from samples after drying at 105°C for 16 hours and are expressed on a wet weight basis (% WWB).
- c) Seed yield from all material collected in the seed bin of the machine after a harvesting run of 200 m. Seed moisture content was determined as in (b) and purity by hand separation from a sample.
- d) Collection on tarpaulins of all trash and soil exhausted from the harvester over a 15 m length of run of the machine. This material was later separated into vegetable material and soil by sieving.
- e) Estimates of total plant material present before and after the passage of the machine from two 1 m² quadrats by removal with a vacuum cleaner. Soil particles were removed from this material by flotation on trichlorethylene and the burr separated from the vegetable matter.

Results:a) Meteorological data:Table 1:- Meteorological data during the period of the experiment.

<u>Time (hrs)</u>	<u>Temperature (°C)</u>	<u>Relative Humidity (%)</u>
1015	22.2	53
1100 (Pass No. 1)	23.9	51
1140 (Pass No. 2)	23.3	50
1215 (Pass No. 3)	23.3	50

Estimated temperature maxima and minima and recorded rainfall for the month of February on the site to the harvest date are shown in Appendix Table 1.

b) Moisture Content (% WWB) of vegetable material on the soil surface before and after harvest

<u>Run No.</u>	<u>Before harvest</u>	<u>After harvest</u>
1	5.9	6.5
2	5.6	6.7
3	4.9	5.0

c) Seed yield from the harvest seed bin

<u>Run No.</u>	<u>Seed yield (kg/ha)</u>		<u>Moisture content (% WWB)</u>		<u>% seed in harvest sample</u>
	<u>uncleaned</u>	<u>cleaned</u>	<u>uncleaned</u>	<u>cleaned</u>	
1	254	172	3.74	3.32	67.74
2	333	200	3.43	3.33	60.00
3	318	193	3.30	3.20	60.67

d) Trash exhausted from machine

<u>Run No.</u>	<u>Total weight of material (kg/ha)</u>	<u>% sand in samples</u>	<u>weight plant material (kg/ha)</u>
1	2707	38.7	1659
2	2050	40.2	1226
3	2625	42.5	1509

e) Estimates of plant material present before and after harvest1) Before harvest

<u>Run No.</u>	<u>Total (kg/ha)</u>	<u>Weight of burrs (kg/ha)</u>	<u>Weight of seed* (kg/ha)</u>
1	2961	1317	395
2	2433	1132	340
3	2513	905	271

*Using seed: burr weight ratio of 30%

ii) After harvest

Run No.	Total (kg/ha)	Weight of burrs (kg/ha)	Weight of seed* (kg/ha)
1	379	93	28
2	228	53	16
3	288	54	16

*Using seed: burr weight ratio of 30%

Discussion:

The site: The paddock chosen for the experiment was close to ideal for harvesting of annual medics. The crop had been well prepared. The soil surface was relatively flat and hard and without residues of weeds, particularly ryegrass. No excess crop residue was present and that remaining had been well broken up by the passage of harrows and cut motor tyres. The residue present was considered to be about normal for harvesting operations in the area.

Harvesting Conditions: As the day was relatively cool, management of material through the harvester was considered to be somewhat more difficult than was generally encountered. There was no doubt however, that the harvester handled the material with ease, with a complete threshing of burrs being accomplished with only a small percentage of cracked seed being evident in the sample. Seed lost to the ground from the machine was negligible.

Moisture Contents of Plant Material: Moisture content of all plant material was low despite high air relative humidity and some rainfall a few days previously. Seed moisture content was very low, presumably due to high percentage hardseededness and the excellent drying conditions experienced in late January and the first 3 weeks of February. The seed moisture content of 3.3% is equivalent to that achieved at a hygroscopic equilibrium relative humidity of 15%.

Harvest efficiency: On the experimental site used an average of 2762 kg of material passed through the machine per hectare. Of this 188 kg (6.8%) was seed, 113 kg (4.1%) was stone and plant material mixed with the seed, 1465 kg (53.0%) was plant residue and 996 kg (36.1%) was soil material vented from the machine with the plant residue. The amount of soil passing from the "chimney" was negligible.

The figure of 6.8% of the total material being seed is probably higher than average over all the dryland medic seed production areas. In many other situations more soil and/or plant material may decrease this efficiency considerably.

Excessive soil and/or plant material have been successfully dealt with by a number of seedgrowers by simple and relatively inexpensive modifications to the harvesting machine. Precleaning devices to remove soil and plant material have been positioned between the pickup and the thresher.

The use or otherwise of the recommended cultural practices of rolling the soil surface and herbicide application will also affect the ultimate result.

The efficiency of pickup of the harvesting machine was high. Of the burr material present only about 6% was not taken up into the machine.

Acknowledgements

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Appendix Table 1

Maximum and minimum temperatures and daily rainfall for February 1977

for the experimental site

<u>Date</u>	<u>Maximum ($^{\circ}$C)</u>	<u>Minimum ($^{\circ}$C)</u>	<u>Rainfall (mm)</u>
1	24	17	
2	29	14	
3	32	17	
4	38	15	
5	28	22	
6	27	15	
7	31	17	
8	34	15	
9	35	17	
10	40	17	
11	41	24	
12	34	29	
13	29	12	
14	28	17	
15	34	15	
16	40	19	
17	38	23	
18	26	20	
19	29	25	
20	30	16	
21	32	30	
22	30	18	0.5
23	31	17	
24	25	15	

Monday-Friday data taken from Records at Edinburgh R.A.A.F. Base.
Weekend data estimated from Adelaide records. Rainfall records
from farmer records.