SUMMER BRASSICA FORAGES IN NORTHLAND

G.J. Piggot[1], C.A. Farrell[2], G.L. Stebleton[3] and P.W. Shannon[1]
Agricultural Research Division
Ministry of Agriculture and Fisheries
Whangarei[1], Auckland[2], and Kaikohe[3]

ABSTRACT

Trials in Northland assessed the production of October-sown forage brassica crops — turnips, kale, rape, wairoa brassica, and fodder radish. Mean yields in mid-February to early March ranged from 6 to 10 t DM/ha at five sites although an exceptional yield (20 t DM/ha) was obtained at a sixth site. No significant differences were measured between crops harvested during late February or early March. Turnips yielded significantly more dry matter than kale or wairoa brassica when harvested in early February while kale yielded more than rape or wairoa brassica if harvested in April in 2 out of 4 trials. Wairoa brassica regrowth following a February harvest (when harvested in April) was significantly greater than kale or rape regrowth in 2 out of 5 trials. Fodder radish needed to be cut prior to bolting to maximise yield of reasonable quality dry matter at a mid-February harvest.

INTRODUCTION

The area cropped to forages in Northland averages between 1500 and 2000 ha per year (Dept. of Statistics, *pers. comm.).* The major proportion is spring-sown for supplementing pasture during summer drought, February generally being the month with the severest pasture shortage. Of the area cropped for summer forage, approximately half is sown in brassicas, the balance being in maize, sorghums or millets. Recent trial work to measure the productivity of brassicas as summer crops is reviewed here.

MATERIALS AND METHODS

The trials were designed in randomised blocks with 3 to 5 replicates. Information on trial sites, crops, and sowing dates is given in Table 1. Plot size was a drill width (1.5 m or 3 m) 5 to 15 m long. The long plots were used where harvesting regimes were applied to sub-plots; short plots were used where whole plots were harvested. Harvest sampling was by quadrats cut with a sickle-bar mower or hand sickle about 5 cm from the ground. Two trials with fodder radish cv. Nerys, conducted in conjunction with trials 4 and 5, had five harvesting regimes replicated four times and imposed upon a fodder radish stand.

TABLE 1: Brassica trial site details.

Trial	Soil/Location	Crop	Cultivar	Sowing Date
1	Ahuriri clay (Kaukapakapa)	Turnips Kale	York Globe Med stemmed	19.11.73
2	Kiripaka silt loam (Kaikohe)	Rape Turnips Wairoa brassica Kale	Rangi York Globe — Med stemmed Kestrel, Giant	1.11.77
3	Pakotai peaty clay (Ruatangata)	Kale Rape	Kestrel Rangi	16.10.78
4	As for trial 2	As for trial 3		11.10.79
5	As for trial 3	As for trial 3		9.10.79
6	Whananaki sand (Otakanini)	As for trial 3		19.10.79

All sites, except for trials 4 and 5, were cultivated by rotary hoe and drilled with a hoe coultered drill. The sites of trials 4 and 5 were sprayed with paraquat and the trials drilled using a triple disc coultered drill. Plots were drilled in 15 cm rows, at between 3 to 5 kg seed/ha for kale, rape and wairoa brassica; 1 kg/ha for turnips; and 7-8 kg/ha for fodder radish. Phosphate and potassium fertiliser was applied at sowing, the rate dependent on soil test, and 50 kg N/ha as urea was broadcast at, or within 6 weeks after, sowing. Post-emergence weed control by a proprietary mixture of chlornitrofen plus pichloram was applied where necessary. Control of major insect pests (larval white butterfly, *Pieris rapae,* and aphids) was conducted only at site 2, despite the presence of these pests at all sites.

Analysis of variance was carried out on untransformed data.

RESULTS

Comparative Yields

Yield data from a harvest taken between mid-February and early March for each trial are given in Table 2. There were no significant differences between crops within each trial. The mean yield of each trial, with the exception of trial 6, ranged between 6 and 10 t DM/ha. Trial 6 gave much higher yields (trial mean 20.4 t DM/ha). In trial 2 there were no significant differences between the kale cultivars and the mean in Table 2 is for the 3 cultivars.

TABLE 2: Brassica yields (t DM/ha) when cut in the period between mid-February to early March.

Trial	Harvest Date	Turnips	Kale	Rape	Wairoa brassica	M.S.D 5%
1	25.2.74	6.1	5.7	—	—	1.5
2	9.3.78	7.1	6.1	7.1	6.2	3.5
3	14.2.79	—	9.5	10.4	9.8	3.8
4	20.2.80	—	5.7	6.6	5.9	2.0
5	21.2.80	—	9.1	7.1	8.8	2.8
6	18.2.80	—	18.2	22.0	20.9	4.8

Harvest Regimes

Turnips produced more dry matter than the other crops in trials 1 and 2 when harvested in early February (Table 3), although the difference between rape and turnips was not statistically significant in trial 2.

TABLE 3: Brassica yields (t DM/ha) when harvested in early February.

Trial	Harvest Date	Turnips	Kale	Rape	Wairoa brassica	M.S.D 5%
1	11.2.74	10.7	4.9	—	—	4.1
2	9.2.78	6.5	3.8	5.4	4.6	1.7

Kale produced significantly more than rape or wairoa brassica at an April harvest in trials 3 and 6 (Table 4). This effect of late harvesting on kale yield did not occur in trials 2, 4 and 5. In trial 2 yields fell over the early autumn period whereas in trial 4 kale and rape yields were similar but significantly higher than wairoa brassica. In trial 5 the occurrence of black rot *(Xanthomonas campestris)* in March influenced autumn growth.

TABLE 4: Brassica yields (t DM/ha) when harvested in April.

Trial	Harvest Date	Kale	Rape	Wairoa brassica	M.S.D 5%
2	24.4.78	6.5	6.7	4.0	3.4
3	26.4.79	21.8	15.5	13.0	5.9
4	11.4.80	11.4	11.1	6.5	4.9
5	8.4.80	5.7	4.5	4.8	2.4
6	16.4.80	21.5	13.7	12.7	7.1

Regrowth

The regrowth following a February harvest was measured for those trials with kale, rape and wairoa brassica (Table 5). In 3 trials there were no statistically significant differences between the crops in regrowth to April, but in 2 trials wairoa brassica regrowth outyielded kale regrowth and, in one trial, rape regrowth.

TABLE 5: Brassica regrowth (t DM/ha) following a February harvest.

Trial	Regrowth Period	Kale	Rape	Wairoa brassica	M.S.D 5%
2	9.2 — 12.4.78	1.3	1.7	2.7	1.3
3	14.2 — 26.4.78	1.9	2.4	1.8	1.4
4	20.2 — 11.4.80	0.5	0.9	1.0	0.4
5	21.2 — 8.4.80	0.8	0.6	0.6	0.6
6	18.2 — 16.4.80	3.4	3.3	3.0	1.0

Fodder Radish

The two harvesting regime trials with fodder radish produced similar results and mean yields are presented in Table 6. Treatments 1 to 3 were harvested prior to bolting (to seedhead), 4 and 5 after bolting. After the first harvest the crops bolted again within 8 weeks. Treatments 2 and 4 produced significantly more total dry matter despite the negligible growth between 18 weeks (mid-February) and 22 weeks. However treatment 2 produced more at the mid-February harvest than treatment 4. The 22 week harvest for treatments 3 and 5 was composed of matured, stalky material.

TABLE 6: Effect of harvesting regime on yields (t DM/ha) of fodder radish cv. Nerys. Mean of 2 sites.

Harvesting Regime	1st cut	2nd cut	Aggregated Total
1. 7wks +14wks +22wks	1.3	5.3	7.5
2. 7wks +18wks +22wks	1.6	8.5	10.1
3. 7wks +22wks	1.6	4.0	5.6
4. 10wks +18wks +22wks	6.9	4.5	11.5
5. 10wks +22wks	6.6	1.6	8.2
M.S.D.$_{5\%}$	2.8	2.1	1.8

DISCUSSION

Brassica yields from five sites when harvested about late February ranged from 6 to 10 t DM/ha, in climatically favourable years. These were low yields when compared with those of kale reported by Stephen (1975) from Otago, and much lower than the results from the sixth site, Otakanini. This site has also yielded exceptional soybean crops (Piggot *et al.*, 1980) and work is required to define why the site was so outstanding. However yields in the 5 to 7 t DM/ha range were reported from South Canterbury by Mortlock (1975). Pasture in Northland yields between 7 to 10 t DM/ha between October and March (Baars, 1976; Piggot *et al.*, 1978), although conservation is required to transfer the spring growth into summer feed supplies. Also sorghum yields at sites of trials 5 and 6 (Piggot and Farrell, 1980) were much higher than the brassica yields from trials alongside, and sorghums can be used as a summer forage. Taylor *et al.* (1975) also recorded high yields of dry matter from sorghums and maize in Northland. Therefore brassicas, as summer forages, appear to have no special advantage for dry matter production when compared with alternative forage crops or pasture.

The main advantage of brassicas as a summer greenfeed is their high digestibilities, although the performance of animals fed brassicas as a sole ration has been disappointing (Claridge, 1972; Barry, 1978). A solution to the nutritional problems may be to use brassica crops as a supplement to summer pasture and, in this role, brassicas may have a value greater than that based solely on their yield of dry matter.

There were no significant yield differences between crops when harvested during mid-February to early March. However the results suggest that if the feed requirement is in January or early February then turnips should be sown. Kale may be a better choice for feeding in March or April. The results also suggest that wairoa brassica may provide better regrowth following a February harvest, and it appears that wairoa brassica is more prone to loss of yield by leaf fall if left unharvested after February compared with kale.

Fodder radish, because of its reproductive development, had inflexible harvesting requirements if grown to both maximise dry matter and avoid the crop maturing with its associated loss in feed value. To maximise available feed in mid-February the crop needed an initial harvest before bolting, when yield was low (2 t DM/ha). However the second, mid-February harvest of regrowth compared favourably with the other crops grown at sites of trials 4 and 5 at the same time; e.g. the mean for the second fodder radish harvest (of treatment 2 in Table 6) was 8.4 t DM/ha compared with the mean of the other brassicas from the two sites (Table 2) which was 7.2 t DM/ha. Fodder radish also established more rapidly than the other brassicas tested and this feature aids in weed control.

ACKNOWLEDGEMENTS

We are grateful for the assistance with harvesting from E.N. Honore and M.L.S. Kingstone, and for the statistical analyses from M.P. Upsdell. We also thank the owners of the sites for their co-operation and interest at all times.

REFERENCES

Baars, J.A. 1976. Seasonal distribution of pasture production in New Zealand. 8. Dargaville. *N.Z. Journal of Experimental Agriculture 4:* 151-156.

Barry, T.N. 1978. Some factors governing the nutritive value of brassica crops. *Proceedings Agronomy Society of N.Z. 8:* 143-148.

Claridge, J.H. 1972. "Arable Farm Crops of New Zealand". A.H. and A.W. Reed Ltd., Wellington.

Mortlock, C.T. 1975. An assessment of some forage crops in South Canterbury. *Proceedings Agronomy Society of N.Z. 5:* 17-19.

Piggot, G.J., Baars, J.A., Cumberland, G.L.B., Honore, E.N. 1978. Seasonal distribution of pasture production in New Zealand. 13. South Kaipara, Northland. *N.Z. Journal of Experimental Agriculture 6:* 43-46.

Piggot, G.J., Farrell, C.A. 1980. Sweet sorghum and beet crops for energy in northern North Island. *Proceedings Agronomy Society of N.Z. 10:* 3-4.

Piggot, G.J., Farrell, C.A., Honore, E.N. 1980. Soybean production in Northland. *Proceedings Agronomy Society of N.Z. 10:* 39-42.

Stephen, R.C. 1975. The influence of sowing date on marrowstem kale production. *Proceedings Agronomy Society of N.Z. 5 :* 27-28.

Taylor, A.O., Rowley, J.A., Esson, M.J., Eastin, J.D., Wallace, R. 1974. Sorghums for conserved feed in Northland. *Proceedings Agronomy Society of N.Z. 4:* 74-78.