A COMPARISON OF DRY MATTER PRODUCTION FROM MEDIUM STEMMED AND MARIS KESTREL MARROWSTEM KALES

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ABSTRACT

The performance of medium-stemmed and Maris Kestrel Kale varieties, sown in October, November and December in each of two years, was examined at monthly intervals after an initial period of growth.

In both years Maris Kestrel was less tall and produced more leaf. The relative contribution of leaf to total dry matter yield declined during growth of both varieties but the extent of the reduction was less for Maris Kestrel; the decline was less also with delay in sowing date.

The total dry matter yields of the two varieties were similar except for the period from June to August in the October sowing when the yields of medium-stemmed were greater.

INTRODUCTION

Medium-stemmed Kale (MS) has been recommended (Keenan, 1971) as a stock feed in New Zealand but another marrowstem Kale, Maris Kestrel (MK), has recently been placed on the acceptable cultivar list. The hybrid, Maris Kestrel, was bred originally in Cambridge, England, as a short-stemmed type to facilitate strip grazing with electric fencing, where it was found to give higher yields of digestible dry matter compared with other varieties, partly because of a less fibrous stem (Thompson, 1966).

Between 1965 and 1969 comparisons of a Cambridge hybrid (possibly Maris Kestrel) with medium-stemmed and/or Giant Kales have been made in New Zealand (Field Research Section, 1966, 1967, 1968, 1969, 1970; Stephen, 1973). Few data were presented but it appeared that Maris Kestrel was the shortest variety, yielded more leaf and produced total dry matter yields that were either lower or similar to medium-stemmed or giant kales. Mortlock (1975), however, reported that the leaf and total yields of Maris Kestrel were comparable to those from medium-stemmed and Giant Kales at later harvests but they were greater at earlier harvests.

The experiments reported here were intended to compare Maris Kestrel and medium-stemmed Kales at intervals during growth from different sowing dates.

MATERIALS AND METHODS

Two similar trials were carried out on a Wingatui silt loam, the first in 1975/76 after three previous crops and the second in 1976/77 following pasture. In 1975/76 sowing dates of October 21, November 26 and December 23 were used and in 1976/77 the sowing dates were October 29, November 30 and December 24. The sowing dates were allocated to main plots in split-plot randomised block layouts with five replicates. Medium-stemmed and Maris Kestrel Kales were compared in sub plots.

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Treflan was rotary-hoed into the soil prior to sowing for weed control and the seed was drilled in 15 cm rows at 3 - 4 kg ha^{-1}. In 1975/76 31 kg P ha^{-1} as reverted superphosphate was drilled in with the seed and 40 kg N ha^{-1} as sulphate of ammonia was broadcast on the soil surface immediately after each sowing. In 1976/77 24 - 26 kg P ha^{-1} as reverted superphosphate was drilled with the seed.

RESULTS

A comparison of variety performance in each year is given in Table 1. In both years medium-stemmed kale was the taller of the two varieties, had a lower average leaf yield and had a lower average contribution of leaf in terms of total yield. At the time of the final sampling in August the total yields of the two varieties were similar except in the October sowing in 1976/77 when the total dry matter production from medium-stemmed kale was 12% higher than that from Maris Kestrel.

Plants of both varieties were taller in 1976/77 compared with 1975/76 and there was also a lower average contribution of leaf to total yield in 1976/77 (Table 1). Leaf and total yields were generally greater in the second year for the October and November sowings but in the December sowing the reverse was true.

The effect of sampling date on the total dry matter production of each variety for each sowing date is shown in Table 2. The yields are averaged over the two years because the trends were similar in each year. In general the total yields of both varieties tended to increase from the time of the first sampling up to June, August and July for the October, November and December sowings respectively. With a single exception in April of the October sowing the total yields of the two varieties were similar up till May. In the October sowing from June till August and in July and August of the November sowing the total yields of medium-stemmed kale tended to be about 10% higher than those from Maris Kestrel but the differences were not always significant; in the December sowing the yields of the two varieties were similar from June to August.

TABLE 1: Comparison of the performance of the two Kale cultivars in 1975/6 and 1976/7

Parameter	Cultivar	SOWING DATE October 75/6	October 76/7	November 75/6	November 76/7	December 75/6	December 76/7
Plant height (cm) at final sample	MS	120 a	170 a	116 a	140 a	106 a	122 a
	MK	84 b	105 b	86 b	90 b	79 b	80 b
	Mean	b 102	a 138	b 101	a 115	b 92	a 101
Total yield at final sample (t/ha)	MS	14.8 a	21.0 a	15.8 a	17.5 a	11.6 a	10.5 a
	MK	13.3 a	18.7 b	13.3 a	16.4 a	11.8 a	9.7 a
	Mean	b 14.1	a 19.8	b 14.5	a 17.0	a 11.7	b 10.1
Average leaf yield (t/ha)	MS	4.4 b	4.4 b	4.9 b	4.5 b	4.7 b	3.6 b
	MK	5.2 a	6.1 a	5.4 a	6.2 a	6.1 a	5.3 a
	Mean	b 4.8	a 5.3	a 5.2	a 5.3	a 5.4	b 4.4
Average contribution of leaf to total DM yield (%)	MS	42 a	35 b	49 b	39 b	54 b	44 b
	MK	50 a	50 a	54 a	56 a	66 a	62 a
	Mean	a 46	b 42	a 52	b 47	a 60	b 53

Letters above and to one side are L.S.D. comparisons horizontally and vertically respectively within sowing dates.

TABLE 2: The influence of sampling time on the total dry matter yields (kg ha^{-1}) of the two kale varieties

Sampling Time/var	SOWING DATE October MS	October MK	November MS	November MK	December MS	December MK
January	a 4470 f	a 4662 e	-	-	-	-
February	a 9370 e	a 8827 d	a 5587 g	a 4894 f	-	-
March	a 12662 d	a 12792 c	a 8749 f	a 8587 e	a 5379 d	a 5922 b
April	a 15131 bc	b 14088 abc	a 10750 e	a 10921 d	a 8767 c	a 7294 b
May	a 14329 cd	a 13916 bc	a 13368 c	a 12640 c	a 9608 b	a 9796 a
June	a 16605 ab	b 15365 ab	a 12022 d	a 12566 c	a 9693 b	a 10368 a
July	a 16257 abc	b 14862 ab	a 15599 b	a 13994 b	a 9785 ab	a 10947 a
August	a 17924 a	b 16010 a	a 16626 a	a 15877 a	a 11069 a	a 10767 a
C.V.%	17.7		18.6		17.1	

TABLE 3: The influence of sampling time on the percentage contribution of leaf to total dry matter yields of the two Kale varieties

Sampling Time/var	SOWING DATE October MS	October MK	November MS	November MK	December MS	December MK
January	b 72 a	a 84 a	-	-	-	-
February	b 57 b	a 62 b	a 71 a	a 75 a	-	-
March	b 38 c	a 56 c	b 52 b	a 67 b	b 69 a	a 82 a
April	b 33 d	a 46 d	b 46 c	a 56 c	b 56 b	a 74 b
May	b 32 d	a 42 de	b 38 d	a 49 d	b 46 c	a 64 c
June	b 26 e	a 39 e	b 33 e	a 49 d	b 44 c	a 58 d
July	b 27 e	a 32 f	b 33 e	a 47 d	b 40 d	a 56 d
August	b 25 e	a 38 e	b 33 e	a 41 e	b 38 d	a 50 e
C.V.%	11.2		9.2		7.0	

The yield contribution of the leaf component in terms of the total dry matter production of each of the two varieties averaged over the 2 years is shown in Table 3. At all sample times in each of the three sowings the contribution of the leaf component of Maris Kestrel was higher than that of medium-stemmed kale. As a consequence the actual yield of leaf from Maris Kestrel was greater than that from medium-stemmed kale though the differences were not always significant.

Within each sowing there was a decline in the proportion of leaf to stem from the first to final harvests (Table 3). The extent of the decline was affected both by the variety and by the date of sowing; the decline was greater in the case of medium-stemmed kale but delay in sowing from October to December reduced the decline.

DISCUSSION

In general the results showed that, irrespective of date of harvesting or sowing, Maris Kestrel was less tall and produced more leaf confirming previous work (Field Research Section, 1966-70). In addition the decline in the proportion of leaf to stem during growth, the extent of which is reduced by delay in sowing date, has been observed previously with medium-stemmed kale (Stephen, 1976) and, not surprisingly, this occurs with Maris Kestrel also.

In harvests up to May for each sowing the total dry matter production was similar for both Kale varieties, regardless of sowing date. Mortlock (1975) reported that total yields of Maris Kestrel were greater at earlier harvests but this does not conflict with the present results because Mortlock's earlier harvests occurred in December for October sowings and February for a December sowing which were earlier than in the trials reported here.

Mortlock (1975) also reported that at later harvest dates the yields of the two varieties were similar. There is evidence in this study which suggests that the total yields of medium-stemmed kale are greater than those from Maris Kestrel but this occurred at harvest dates much later than those examined by Mortlock. The increased yields of medium-stemmed over Maris Kestrel (Table 2) may be a reflection of the capability of the former to continue growing for a longer period.

Plant height, leaf and total (excepting the December sowing) yields were greater in 1976/77 compared with the previous year. The improvement in the second year was probably due in part to the more favourable conditions for growth that occurred in the autumn 1977 compared with 1976 in which March and April were exceptionally dry. In addition, growth may have been poorer in the first year because of poorer soil fertility as a consequence of being the fourth successive crop after pasture; in 1976/77 the trial followed immediately after pasture. The greater production of leaf by Maris Kestrel compared with medium-stemmed kale would seem to recommend its use by farmers for stock feeding during early growth when total dry matter yields of the two varieties are similar. Organic matter digestibilities of kale leaf are known to be higher than those of the stem (Stephen 1976, Anon., 1977) and therefore the greater leaf to stem ratio of Maris Kestrel would be advantageous in terms of total

digestible dry matter. In addition, Thompson (1966) reported that the percentage of fibre in stems of commercial varieties was much higher than that in Maris Kestrel and this was confirmed by observations made by Mortlock (1975). Accordingly Maris Kestrel has advantages over medium-stemmed kale even during later growth when total yields of the latter may be slightly higher.

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