

# PERFORMANCE OF ASPARAGUS CULTIVARS IN CENTRAL OTAGO

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## ABSTRACT

When grown in Central Otago, the standard New Zealand cultivars Mary Washington 500W (MW 500W) and Rutgers Beacon and some higher yielding cultivars, such as Limbras 10, Jersey Giant (56 x 22-8) and UC 157 produced total yields which were similar to yields obtained from sites in other parts of the country. However in Central Otago saleable yields were much lower because the bracts on the asparagus spears opened earlier.

Yield and quality of the spears was not consistently correlated with various measures of temperature either between years or between cultivars. However the harvest which produced the lowest percentage of saleable spears coincided with the harvest period which had the highest number of days with ground frost.

Cultivars for Central Otago need to be determined in the district and unless cultivars producing high yields of saleable spears can be identified, future development of the asparagus industry in Central Otago will be hindered.

*Additional Key Words: temperature, frost, yield, spear quality.*

## INTRODUCTION

An evaluation of asparagus cultivars was begun at Alexandra, Central Otago in spring 1981, as part of a national series of trials (Bussell *et al.*, 1984). The purpose of these trials was to find cultivars yielding more than MW500W and Rutgers Beacon, which are at present the standard cultivars. A reliable evaluation of yield performance of new cultivars can be obtained after two years of harvesting (Bussell *et al.*, 1986). In this paper, we outline yield performance and discuss effects of temperature on yield and spear quality in the first three years of harvesting.

## MATERIALS AND METHODS

The trial contained the standard cultivars MW500W and Rutgers Beacon and 20 new cultivars from European and American sources. The cultivars can be divided into seven groups based on their origin and type (Table 1). Seeds were sown in late spring in 1980 at Levin Horticultural Research Centre. In the spring of 1981 one year old dormant crowns were transplanted at Alexandra in rows 1.5 m apart with 45 cm spacings between plants within the row (population 15,000 plants/ha). Cultural practices closely followed normal commercial practice (Franklin *et al.*, 1980; Bussell *et al.*, 1981).

In 1983 and 1984 the trial was harvested over a period of 40 days, and in 1985 for 80 days. The harvest period for 1984 would normally have been 80 days but it was shortened to allow a longer period of fern growth so that the plants could recover from damage due to bromacil herbicide, sustained after harvest the previous year. In 1983 the trial was harvested three times a week and in the 1984 and 1985 seasons, harvesting was carried out five times a week and in the 1984 and 1985 seasons, harvesting was carried out five times a week (Monday to Friday) in the early part of the season (17 days in 1984 and 33 days in

TABLE 1: Asparagus cultivars grown at Alexandra.

Group	Cultivars
1. Standard	Mary Washington 500W (MW500W) <sup>a</sup> , Rutgers Beacon <sup>a</sup>
2. Dutch dioecious	Limbras 10 <sup>a</sup> , Limbras 18 <sup>a</sup> , Limbras 22
3. German all male	Lucullas <sup>a</sup> , Sieg
4. German dioecious	Schwetzingen Meisterschuss <sup>a</sup> , Spaganiva <sup>a</sup> , Fruhbote, Huchels Leitungsauslese
5. French double dioecious	Diane <sup>a</sup> , Minerve, Junon <sup>a</sup> , Mira
6. French clonal dioecious	Aneto <sup>a</sup> , Bruneto, Cito <sup>a</sup> , Desto <sup>a</sup>
7. American dioecious and all male (*)	UC157 <sup>a</sup> , Jersey Giant (56x22-8) <sup>a*</sup> Md10x22-8*

<sup>a</sup> - commercially available and, all except Spaganiva, harvested in 1983 and 1984.

\*-all male plant.

1985) and three times a week for the remainder of the season.

In the 1983 season, yield was recorded from all twenty two cultivars but in 1984 it was recorded from only the thirteen cultivars which had yielded well in 1983 and were still available commercially. In 1985 only the two standard cultivars and three new cultivars (Limbras 10, UC157 and Jersey Giant) which had performed well throughout New Zealand (Bussell *et al.*, 1985) were harvested.

At each harvest the following was recorded:

- (i) the total weight of untrimmed spears.
- (ii) the weight of first grade spears (straight spears of at least 10 mm basal diameter and with unopened bracts) trimmed to 180 mm length.
- (iii) the weight of trimmed unsaleable spears.

The percentage saleable yield was calculated as the weight of trimmed saleable spears in the total weight of trimmed spears.

Temperatures were recorded at the meteorological station at the DSIR Research Orchard near Clyde during the harvest season. The station, 4 km from the experimental site, has a similar aspect, altitude and soil type to the trial site.

## RESULTS AND DISCUSSION

Plant survival was recorded in late January 1986, about four years after the trial was planted, and ranged from 83% to 96%. This is similar to survival recorded in other parts of the country (Bussell, unpublished data). The five cultivars recorded in the 1983, 1984 and 1985 seasons had between 89% and 95% survival.

Harvest data for 1983 and 1984 are given in Table 2. Most of the new asparagus cultivars had higher total yields than the two standard cultivars, MW500W and Rutgers Beacon. Saleable yields were highest in cultivars from the American group and the Dutch group. UC157, an American dioecious cultivar, gave the highest yields of saleable spears. The results show that none of the new cultivars excluded from the 1985 harvest outperformed the three that were selected. The remaining results presented in this paper will, therefore, deal only with the two standard cultivars, MW500W and Rutgers Beacon, and the three new cultivars Limbras 10, UC157 and Jersey Giant.

Total yields from the two standard and three new cultivars grown in Central Otago in 1983 and 1984 were similar to those obtained elsewhere in the country (Table 3). However saleable yield and the percentage of saleable spears harvested were much lower (Table 3). Low saleable yields, caused primarily by early opening of bracts, will hinder future development of the Central Otago asparagus industry.

**TABLE 2: Yields from the first two harvests of asparagus grown at Alexandra in 1983 and 1984.**

Group	Cultivar	Yield (t/ha)		Saleable spears
		Total	Saleable	%
1	MW500W	5.65	0.50	15
	Rutgers Beacon	5.52	0.76	23
2	Limbras 10	9.93	0.94	15
	Limbras 18	7.82	0.83	17
3	Lucullus	5.97	0.27	8
4	Schwetzingen	5.91	0.64	19
	Meisterschuss			
5	Diane	7.89	0.48	9
	Junon	8.86	0.96	16
6	Aneto	7.58	0.21	4
	Desto	7.23	0.35	8
	Cito	9.62	0.45	8
7	UC157	6.78	1.59	38
	Jersey Giant	8.85	0.88	16
LSD 5%		1.67	0.29	4

**TABLE 3: Yields of asparagus harvested for two years (1983 and 1984) at Alexandra and at six N.Z. research stations (means of five cultivars).**

	Six research station sites <sup>a</sup> Alexandra			
	Highest	Lowest	Mean	
Total yield (t/ha)	11.47	6.35	8.93	7.35
Saleable yield (t/ha)	5.61	2.20	3.95	0.90
% saleable spears	74	48	63	22

<sup>a</sup>Research stations are Rukuhia, Hamilton; Hastings H.R.S.; Flock House, Bulls; DSIR, Riwaka; DSIR, Riwaka; DSIR, Lincoln; Yates Seed Research, Christchurch.

The low percentage of saleable spears occurring at Alexandra was confirmed in two smaller trials in the same national series which were established at non-irrigated sites near Roxburgh and harvested only in 1983. Yields were generally lower at Roxburgh than at Alexandra but percentages of saleable spears were similar. Irrigation is likely to have caused the improvement in yields obtained at Alexandra.

Total and saleable yields and the percentage of saleable spears harvested for the five cultivars recorded in the 1983, 1984 and 1985 seasons are given in Table 4. For UC157 and MW500W, which had respectively the highest and lowest percentage of saleable spears harvested, an attempt was made using multiple regression to correlate yield and quality of the spears within each of the three harvest

**TABLE 4: Yields of five cultivars of asparagus harvested for three years at Alexandra.**

		1983	1984	1985	Mean
MW500W	Total yield (t/ha)	2.53	3.38	6.24	4.05
	Saleable yield (t/ha)	0.38	0.16	0.64	0.39
	% Saleable spears	25.1	7.8	17.1	16.7
Rutgers Beacon	Total	2.02	3.80	4.88	3.57
	Saleable	0.50	0.21	0.58	0.43
	% Saleable	39.2	10.3	17.5	22.4
Limbras 10	Total	3.41	4.16	8.56	5.38
	Saleable	0.70	0.22	1.12	0.68
	% Saleable	35.3	9.8	24.2	23.1
UC157	Total	2.79	3.90	7.75	4.81
	Saleable	0.88	0.38	1.28	0.85
	% Saleable	48.7	17.9	26.3	31.0
Jersey Giant	Total	3.20	5.05	7.74	5.33
	Saleable	0.53	0.20	0.88	0.53
	% Saleable	26.4	6.8	21.5	18.2
LSD 5%	Total	1.11	1.85	3.09	1.51
	Saleable	0.39	0.28	0.74	0.41
	% Saleable	18.2	11.2	11.1	12.8
cv%	Total	25.8	29.6	28.7	21.2
	Saleable	41.9	77.8	53.3	46.5
	% Saleable	33.6	69.5	33.8	37.4

seasons with various measures of temperature. These correlation studies failed to produce any clear and consistent trends either within or between years or between cultivars. However one factor that may be important in explaining differences in the percentage of saleable spears harvested in different years is the number of spring ground frosts occurring during the harvest season. There were more days with ground frosts occurring during the harvest season in 1984 than in 1985, or 1983 (Table 5). The percentage of saleable spears harvested was highest in 1983, followed by 1985 then 1984 (Table 4) but we cannot fully explain at present why the yields of saleable spears are lower in Central Otago than in other parts of the country.

At the beginning of the 1984 and 1985 seasons, when spears were harvested five times a week the average percentage of saleable spears harvested was up to one fifth higher than during the period later in the season when harvesting was less frequent. The higher percentage of saleable spears obtained during periods of more frequent harvesting still did not match those obtained elsewhere in the country.

**TABLE 5: Mean temperature (°C) and frost during three harvest seasons at Alexandra.**

	Harvest Season		
	1983 17 Oct - 25 Nov	1984 15 Oct - 23 Nov	1985 26 Sept - 13 Dec
Air maximum temp.	19.0	21.5	19.1
Air minimum temp.	7.1	6.1	6.4
Air mean temp.	13.1	13.8	12.8
Air diurnal range	12.1	14.4	13.0
10 cm soil temp	13.5	14.0	13.7
Grass minimum temp.	3.4	2.2	2.5
%days with ground frost	15.0	37.5	33.8

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