THE YIELD PERFORMANCE OF FIVE RECENTLY RELEASED POTATO CULTIVARS

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SUMMARY

Five new potato cultivars; Toru, Wha, Rima, Ono and Whitu bred by C.M. Driver, Crop Research Division, Lincoln, were compared in thirty field trials conducted by the Field Research Section, Research Division, Ministry of Agriculture and Fisheries, throughout New Zealand during the period 1965 to 1970.

Toru, Wha and Whitu were superior and Rima similar in yield to the standard Ilam Hardy. Ono appeared to have a slight advantage over Ilam Hardy but the comparison was only made in five trials.

If quality aspects prove satisfactory the recently released cultivars should be of considerable advantage to the New Zealand potato industry.

INTRODUCTION

The Potato Section of the Crop Research Division, D.S.I.R., headed by C.M. Driver, recently released five new hybrid cultivars: Toru, Wha, Rima, Ono and Whitu. These cultivars show resistance to late blight Phytophthora infestans with Toru more highly resistant than the others. Toru is an early potato, bred for the warmer wetter areas of the North Island, Wha and Whitu are bred specifically for frying as crisps and French fries. Rima is suited to heavier soils or light soils under irrigation and gives good quality French fries. Ono was bred for soils of high fertility where other cultivars produce too large tubers (Annual Report, D.S.I.R., 1972). Rima shows good resistance to virus diseases while Toru, Wha and Whitu show partial resistance and Ono some resistance (C. M. Driver pers. comm.).

During the period 1965 to 1970 the Field Research Section, Research Division, Ministry of Agriculture and Fisheries evaluated the yield capabilities of the five new cultivars in comparison with Ilam Hardy and Rua as standards. Thirty trials were conducted throughout New Zealand with annual trials in the Pukekohe, Rangitikei, Timaru, Mosgiel and Winton localities and additional trials less regularly at Hamilton, Takapau, Hastings and Winchmore.

METHODS

Initially the new cultivars were brought forward from the D.S.I.R. amongst a range of promising lines and were tested with up to 20 other hybrids in single row duplicate plots of 20 tubers. From these trials 6 to 10 superior lines were sown in replicated randomized block trials consisting of one or two harvest rows with adjacent guard rows as recommended by Mountier (1964). The number and variety of cultivars varied in the individual trials depending on the availability of the tubers and as a consequence of the lack of seed not all the new cultivars were compared in all trials. Ilam Hardy and Rua were sown as standards in most trials but the poor establishment of Rua in many trials affected its yield and only comparisons with Ilam Hardy are made here.

Individual trial rows spaced at 80 cm were six metres long with the tubers, sown with basal NPK fertiliser, 30 cm apart within the rows.

Weed and disease control and moulding were carried out as necessary.

Individual trial data has been combined to produce an overall summary for comparison.

RESULTS

Tuber Yield:

The average tuber production for all trials of the individual cultivar comparisons are shown in Table 1. Toru, Wha and Whitu were 27, 24 and 22% superior to Ilam Hardy. Ono was 15% superior and Rima was similar in yield. There were fewer trials comparing Ono and Ilam Hardy. Ono and Rima were 24% lower in yield than Wha but Whitu gave a similar yield.

TABLE 1 : MEAN TUBER YIELDS KG/HA OF CULTIVARS AND THEIR YIELDS RELATIVE TO THOSE OF ILAM HARDY AND WHA.

Number of Trials	Mean Yields						Relative Yields	
	Ilam Hardy	Toru	Wha	Rima	Ono	Whitu	Ilam Hardy 100	Wha 100
9	40,100	49,800	-	-	-	-	124	
13	37,100	-	47,200	-	-	-	127	
11	41,800	-	-	42,100	-	-	101	
5	34,500	-	-	-	39.500	-	115	
13	37,100	-	-	-	-	45,400	122	
9	-	-	55,800	42,500	-	-		76
5	-	-	56,800	-	43,000	-		76
17	-	-	50,200	-	-	51,400		102

TABLE 2 : SUMMARY OF STATISTICAL ANALYSES ($P > 0.05$ v ILAM HARDY) OF TUBER YIELDS OBTAINED IN INDIVIDUAL FIELD TRIALS

Cultivar	Number of Trials	Number Trials Cultivar Superior	Number Trials Ilam Hardy Superior
Toru	9	4	-
Wha	13	6	-
Rima	11	2	2
Ono	5	1	-
Whitu	13	6	1

TABLE 3 : TUBER YIELDS OF CULTIVARS IN NORTH AND SOUTH ISLANDS RELATIVE TO THAT OF ILAM HARDY (100)

Cultivar	Number of Trials	North Island	Number of Trials	South Island
v Ilam Hardy = 100				
Toru	6	129	3	111
Wha	7	134	6	120
Rima	6	99	5	102
Ono	4	119	1	102
Whitu	7	130	6	114

These trends are supported by the summary of the statistical analyses for the individual randomised block trials shown in Table 2.

Splitting the trial results into North and South Island groups indicated that Toru, Wha and Whitu had a greater superiority over Ilam Hardy in the North than the South Island (Table 3).

Growth Habit and Tuber Form:

A summary of the growth habit and tuber form of the cultivars is given in Table 4. Toru, Wha, Whitu and Ono have an advantage over Ilam Hardy and Rima of having shallow eyes, but one disadvantage of Wha and Whitu is the tendency to produce oversized tubers.

DISCUSSION AND CONCLUSION

These results indicate that Toru, Wha and Whitu are superior to Ilam Hardy in tuber production. Ilam Hardy is susceptible to late blight (Driver 1966) and the resistance of these new potato cultivars to this disease appears as one reason for the improved production, although this has not applied in the case of Rima. The increased advantage of the new cultivars Wha, Whitu and Toru over Ilam Hardy in the warmer and wetter conditions of the North Island compared to the South Island support this premise. Some symptoms of late blight were recorded on all the new releases but Ilam Hardy was always considerably more affected.

In the case of late blight susceptible cultivars, some farmers in the Rangitikei district may spray as often as eight times in one season to control the disease (Blackmore et al 1971). Consequently, in such situations these new resistant cultivars have a distinct advantage.

While Wha and Whitu were bred specifically for frying their high production could make them important main crop table potatoes if their quality was acceptable. Both these cultivars have a tendency to produce over-size tubers under some conditions and it was for such situations that the lower yielding Ono was released (Annual Report, D.S.I.R., 1972). Further research is being conducted to overcome the problem of excessively large tubers in Wha and Whitu crops.

The adaptation of Toru to the warm and wetter areas of the North Island, for which it was bred, is borne out by the fact that all the four trials in which it significantly out-yielded Ilam Hardy were

TABLE 4 : GROWTH HABIT AND TUBER FORM OF POTATO CULTIVARS

	Tops and Flowers	Tubers
Ilam Hardy	Semi erect, medium height, medium to bulky tops, mauve flowers.	Round/oval, smooth and white, good shape, medium eye depth.
Rua	Semi-erect to erect, medium height, bulky tops, white flowers.	Oval tubers of good size, smooth, white skin, shallow eyes.
Toru	Semi erect and open medium height, medium bulk, mauve flowers.	Round/oval tubers with smooth white skins. Shallow eyes.
Rima	Semi erect, medium height, bulky tops inclined to sprawl, mauve flowers.	Round tubers, medium size, rough red skins. Medium to deep eyes.
Wha	Erect habit, tall. White flowers	Round/oval and irregular, sometimes ugly, white rough skin. Shallow eyes. Tendency to over-sized tubers.
Whitu	Erect habit, tall. White flowers	Round/oval tubers, white, shallow eyes. Tendency to produce large but well shaped tubers.
Ono	Erect habit. Tall. White flowers	Round/oval white tubers of medium size. Shallow eyes.

in the north. Toru, Wha and Whitu on the basis of tuber yield should replace Ilam Hardy as the standard provided their quality aspects are satisfactory (Driver, 1971). Rima has proved similar in yield to Ilam Hardy and its future use must be largely based on its quality attributes or its greater resistance to disease than the standard. The yield superiority of Ono over Ilam Hardy remains in doubt, and as no data were collected on tuber size no predictions can be made on the future role of this cultivar.

ACKNOWLEDGEMENTS

We would like to thank our colleagues in the Field Research Section; the Director, Invermay Agricultural Research Centre and the Superintendent, Winchmore Irrigation Research Station for conducting trials and permission to use data from those trials; C.M. Driver, Crop Research Division, Lincoln, for advice and supply of the experimental tubers; and C.B. Dyson, Biometrics Section for helpful suggestions and analysis of data.

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