

Paper 11

FIELD PEA CULTIVARS

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INTRODUCTION

Peas (*Pisum sativum* L.) have been the most important grain legume in New Zealand for many years. Two types are usually referred to: garden peas and field peas, as explained by Casey (1986).

Official statistics group both field peas and garden peas grown as a seed crop under the classification "peas for threshing" (Department of Statistics, 1982; Logan, 1983). A fair estimate of field pea statistics in the early 1980s would be around 15,000 ha per year, producing some 45,000 to 50,000 tonnes. Of this about 70% of the crop is exported, at a value of some \$11 million. The major growing area is Canterbury — about 75% of the crop. Production varies considerably, however, according to market demands, as reflected in the smaller market in more recent seasons.

There is no national trial system for peas. A farmer's choice of cultivar is most greatly influenced by its marketability; especially by the availability of a contract for his produce with a merchant. However, some cultivar evaluation trials are conducted by both private and public sectors of the industry.

FIELD PEA GROUPS

In New Zealand field peas are classified according to seed coat colour — the four groups are outlined in Table 1. In some countries they are classified by cotyledon colour.

Other minor types such as green maples and brown marrowfats have not yet been grown on a commercial scale in New Zealand.

SOURCES OF NEW CULTIVARS

Sources of new cultivars in this country are:

- Breeding by Crop Research Division, D.S.I.R.
This work is based at Lincoln, and the history of early introductions and CRD breeding has been well documented (Jermyn, 1983; 1987). Considerable emphasis has been placed on incorporating multiple disease resistances into new cultivars.
- Introductions from overseas breeders.
The adaptability of the species has allowed successful introduction of some overseas cultivars. The advent of Plant Variety Rights in 1973 has made available new

Table 1. Field pea groups.

Group	Seed shape	Seed coat colour	Cotyledon colour	Flower colour
Maple	Round to dented	Mottled brown	Yellow	Purple
White	Round	White	Yellow	White
Blue (round)	Round	Blue-green	Green	White
Marrowfat	Sides flattened to dented	Blue-green	Green	White

Table 2. Maple pea cultivars grown in N.Z. — origin and disease reaction.

Cultivar	Origin	Diseases					
		NZ agent	NZ release	Pea wilt	Top yellows	Pea mosaic	Downy mildew
Partridge 73	CRD, NZ	Various	1973	R	T	S	T
Whero *	CRD, NZ	WNMA	1977	R	R	I	T

(R = resistant, T = tolerant, S = susceptible, I = immune, CRD = Crop Research Division, WNMA = Wrightson NMA Ltd).

Table 3. Maple pea cultivars grown in N.Z. — morphology, yield and adaptability.

Cultivar	Straw Length	Maturity	Yield in PGG spring trials	Adaptability
Partridge 73	VL	VL	50	Often autumn sown on light soil
Whero *	L	L	100 (4.2 t/ha)	Spring or autumn sown light to medium soil.

(VL = very late, L = Late, PGG = Pyne Gould Guinness Limited, * = protected by PVR).

cultivars from northern hemisphere breeders. This has enabled merchants to react quickly to market forces, such as the development of the marrowfat trade in recent years.

- Breeding by the private sector.

As yet no new cultivars of field peas have been produced by the New Zealand private breeders. This work has only recently begun and is on a minor scale.

Generally, size, colour, damage susceptibility and condition are considered. Standard product quality grades are used by members of the N.Z. Agricultural Merchants' Federation.

Yield ability

There is variation in both genetic potential, and in cultivar response to environmental conditions. For example, a cultivar may have very high yield potential in good conditions but may be considerably outyielded by others under stress conditions.

In Tables 3, 5, 7 and 9 yield figures are presented from replicated trials conducted by Pyne Gould Guinness Limited at "Ceres" Research Farm. The soil type is a light Templeton silt loam, which is intensively cropped. The results are from 3 seasons' trials unless otherwise stated, and are expressed relative to a control cultivar. As they represent only one site, they may not represent true yield potential in other districts.

CULTIVAR DEVELOPMENT

The main criteria in development of a new cultivar are marketability, yield, disease resistance and adaptability.

Production of a marketable commodity.

For a cultivar to be in commercial use it must be required by an end-user. The influence of contract availability for the seed product highlights this fact. Quality requirements vary slightly with different pea groups.

Table 4. White pea cultivars grown in N.Z. — origin and disease reaction.

Cultivar	Origin	NZ agent	NZ release	Diseases		
				Pea wilt	Top yellows	Pea mosaic
White Prolific	CRD, NZ	Various	1943	R	R	S
Pamaro	CRD, NZ	Various	1973	R	R	S
Huka	CRD, NZ	Various	1975	R	R	I
Birte	Holland	PGG	1975	S	S	S
Amino	France	PGG	1982	(R)	S	S

(CRD = Crop Research Division, PGG = Pyne Gould Guinness Limited, R = resistant, S = susceptible, I = immune).

Table 5. White pea cultivars grown in N.Z. — morphology, yield and adaptability.

Cultivar	Straw length	Maturity	Yield in PGG spring trials	Adaptability
White Prolific	M	L	75	—
Pamaro	M	M	85	—
Huka	S-M	L	100 (4.42 t/ha)	Weak straw, good disease resistance, high yield.
Birte	S-M	E	77	Stiff-strawed, wet disease-free areas.
Amino	M	E	95	Good yield in disease-free areas.

(PGG = Pyne Gould Guinness Limited, M = medium, S = short, L = late, E = early).

Disease resistance

Several diseases may have serious economic effects on yield (Ashby *et al.*, 1987). These are most effectively overcome by growing cultivars with good levels of resistance to the pathogens.

Pea wilt (*Fusarium oxysporum* var. *pisi*). Race 1 can devastate large areas of susceptible cultivars and is widespread in most pea areas. Most field pea cultivars are resistant to this disease.

Virus diseases are transmitted by several aphid species. The worst in field pea areas are:

- Top yellows which is caused mainly by subterranean clover red leaf virus (SCRLV) but may also result from bean, or pea leaf roll virus (BLRV). Top yellows is prevalent in warm, dry South Island districts, as the main source of inoculum and vector are white clover crops (Ashby, 1982).
- Pea mosaic virus, a strain of bean yellow mosaic virus (BYMV) is found in warmer districts and has spread in Canterbury. Inoculum source is from overwintering on other legume hosts such as clovers and beans (Ashby, 1982).

- Alfalfa mosaic virus (AMV) and pea seed-borne mosaic virus (PsbMV) may also cause problems. Their effects are under investigation.

Downy mildew (*Peronospora pisi* Syd.) may cause damage in cool, damp conditions, especially if the infection becomes systemic.

Disease reactions of cultivars are presented in Tables 2, 4, 6 and 8 (Jermyn, 1984).

Cultivar adaptability

There are marked differences in cultivar adaptability to local conditions. Often this is related to morphology. For example, a short, stiff-strawed, early maturing cultivar which can be readily harvested is important for a cool, wet district with short growing season. However, under hot, dry, long season conditions this cultivar may not grow enough straw to harvest easily, and would not yield to the full potential of the growing season.

Similarly, viruses may not be a major problem in areas where aphid flights or inoculum reservoirs are restricted. This may enable cultivars with agronomic advantages to be grown despite disease susceptibility.

Table 6. Blue pea cultivars grown in N.Z. — origin and disease reaction.

Cultivar	Origin	NZ agent	NZ release	Pea wilt	Diseases	
					Top yellows	Pea mosaic
Blue Prussian 67	CRD, NZ	Various	1967	R	R	I
F3	—	WNMA	1978	R	R	S
PV12	—	PGG	c1965	R	R	I-S
Rondo	Holland	Various	c1965	S	R	S
Rovar	Holland	Various	c1965	R	T	S
Solara *	Holland	PGG	1985	R	R	S
Impulse *	CRD, NZ	WNMA	1985	R	R	I

(CRD=Crop Research Division, WNMA=Wrightson NMA Limited, PGG=Pyne Gould Guinness Limited, R=resistant, S=susceptible, T=tolerant, I=immune, *=protected by PVR).

Table 7. Blue pea cultivars grown in N.Z. — morphology, yield and adaptability.

Cultivar	Straw length	Maturity	Seed size	Yield in PGG trials	Adaptability
Blue Prussian 67	L	La	Small	90	Light soils
F3	M	M-La	Small	(96)	Most districts
PV12	M	M	Small	95	Most districts
Rondo	S-M	M	Medium	100	Medium-heavy land
Rovar	S-M	M	Medium	100	Medium-heavy land
				100	
				(4.41 t/ha)	
Solara *	M	M	Medium	(115)	Semi-leafless
Impulse *	M	M-La	Medium	(112)	New release
					Semi-leafless
					New release

(PGG=Pyne Gould Guinness Limited, L=long, M=medium, S=short, La=late).

In Tables 3, 5, 7 and 9, comment on adaptability is made where relevant.

CULTIVARS

Maple

Just two cultivars are commonly used, Partridge 73 and Whero. Both are long-strawed with a rather long growing season. They may be sown early, Partridge 73 usually being autumn sown, and are commonly grown on light soils. Most maples are exported for the pigeon feed market or for splitting.

White

Several cultivars are used, with Huka and Birte being most important. The latter is restricted to areas with low disease pressure, but is important in wetter areas such as Southland. White peas are mostly used in export and local splitting trades.

Round blue

These can be divided into two groups:

- the small seeded "Prussian" type
- the larger seeded "Rondo" type.

Consumer preferences determine their market, but both types are used as "boilers" or for splitting.

It is probable that the names Rondo and Rovar are synonymous in New Zealand, as so-called Rondo lines are resistant to pea wilt.

Of special interest are the new releases Solara and Impulse which are the first semi-leafless field peas introduced to New Zealand markets. This type has greater standing ability and are reported to use water more efficiently than conventional type peas (Wilson *et al.*, 1981). A new series of semi-leafless cultivars may be introduced in other field pea groups.

Marrowfat

The area of marrowfat peas in New Zealand has expanded in recent years, with the development of Asian markets where they are used in confectionery. Product quality is very important.

REFERENCES

- Ashby, J.W. 1982. Virus Diseases of Peas. *Aglink FPP606*. MAF Media Services.
- Ashby, J.W., Goulden, D.S., Russell, A.C. 1987. Recognition and control of foliar disease of peas. *In: Peas: Management for Quality*. W.A. Jermyn & G.S. Wratt (eds.). *Agronomy Society of N.Z. Special Publication 6*: 41-44.

Table 8. Marrowfat pea cultivars grown in N.Z. — origin and disease reaction.

Cultivar	Origin	NZ agent	NZ release	Pea wilt	Diseases		
					Top yellows	Pea mosaic	Downy mildew
Maro	Holland	Various	c1970	R	T	S	S
Greengolt	Holland	Various	c1970	R	T	S	T
Carpo *	Holland	PGG	1980	R	T	S	T
Primo *	Holland	PGG	1980	R	T	S	T
Ichiban *	Holland	PGG	1980	R	T	S	S
Progreta *	England	DC/WNMA	1981	R	S-T	S	S

(PGG = Pyne Gould Guinness Limited, DC = Dalgety Crown Limited, WNMA = Wrightson NMA Limited, R = resistant, T = tolerant, S = susceptible, * = protected by PVR).

Table 9. Marrowfat Pea cultivars grown in N.Z. — morphology, yield and adaptability.

Cultivar	Straw length	Maturity	Seed colour	Yield in PGG trials	
				Yield in PGG trials	Adaptability
Maro	M	M	Light	100 (4.45 t/ha)	Reliable
Greengolt	M	M	Dark	96	Dry-medium soil
Carpo	M	M	Dark	95	Medium soils
Primo	M	M	Light	104	High yield potential on medium soils
Ichiban	M-L	M	Dark	103	Good on dry to medium soils
Progreta	M	M	Light	93	Tare-leafed, suits wetter conditions

(PGG = Pyne Gould Guinness Limited, M = medium, L = long).

- Casey, J. 1987. Garden pea cultivars: adaptability and uses. *In: Peas: Management for Quality*. W.A. Jermyn & G.S. Wratt (eds.). *Agronomy Society of N.Z. Special Publication 6*: 63-66.
- Department of Statistics, 1982. N.Z. Agricultural Statistics. Year ended 30 June 1980.
- Jermyn, W.A. 1983. Peas. *In: Plant Breeding in N.Z.* G.S. Wratt & H.C. Smith (eds.). Butterworths and D.S.I.R. pp. 57-62.
- Jermyn, W.A. 1984. Pea management and cultivar guide. *Crop Research Division Report 95*. 6 pp.
- Jermyn, W.A. 1987. Pea cultivar development. *In: Peas: Management for Quality*. W.A. Jermyn & G.S. Wratt (eds.). *Agronomy Society of N.Z. Special Publication 6*: 53-56.
- Wilson, D.R., Hanson, R., Jermyn, W.A. 1981. Growth and water use of conventional and semi-leafless peas. *Proceedings of the Agronomy Society of N.Z.* 11: 35-39.