VARIATION IN YIELD OF COMMERCIAL FIELD PEA CROPS IN SOUTHERN NSW

S.H. Ackland[1] and E.L. Armstrong[2]

[1]NSW Agriculture, Moree, NSW 2400 ??[2]NSW Agriculture, Wagga Wagga, NSW 2650

Abstract

The extreme variability of field pea yields in southern NSW over a 12 year period (1984-95) is highlighted from shire cropping statistics, data collected from TOPCROP and farmer interviews. Based on shire yields, four yield groups in southern NSW were identified ie. A, >1.5 t/ha; B, 1.1-1.5 t/ha; C, 0.9-1.1 t/ha; and D,<0.9 t/ha. As expected, yield group A is located in the highest rainfall zone and yield group D in the drier western areas. Reasons for such large yield variation, even between neighbouring paddocks, can be attributed not only these environmental differences, but to inconsistent management practices, inappropriate paddock selection, poorly planned rotations and unsuitable varieties. It is suggested management packages and varieties be tailored to specifically meet requirements of these different areas. Profitability and farmer acceptance of the crop will grow as more erect varieties with improved seed quality are released, giving growers added incentives to adhere closely to sound agronomic practices.

Key words: Field pea, yield, yield variability, statistics, shires.

Statistics on historical performance of commercial field pea crops in southern NSW are almost universally presented as single all-encompassing state-wide means (Table 1). This does not truly reflect the enormous variability in yield that is known to occur over seasons, across regions, within a region, between farmers and even between paddocks on the same farm. A better understanding of this yield variability would help tailor development of new cultivars, assist in formulation of management guidelines for specific regions differing in commercial yield potential and redirect research programs. State-wide means, because of this large variability component, can be poor indicators of genetic and agronomic gains over time.

This paper utilises shire statistics provided by the Australian Bureau of Statistics between 1984-1995 (2) to categorise production areas in southern NSW into four groups based on achieved yields. It also uses, as an example, TOPCROP data collected in the Forbes/Parkes area in 1993 (1) - firstly to assess yield variability across a particular region and between neighbouring farmers, and secondly to isolate critical management factors associated with producing high yielding field pea crops. ?TOPCROP is as national crop monitoring program which aims to improve grower profitability by bringing together grower and research experience to focus on critical management practices (3). Finally, four key field pea producers were interviewed in an effort to substantiate these findings and to isolate other important issues and challenges producers are facing at a paddock level and may face when incorporating peas and other pulses into their winter crop rotations in southern NSW (4).

Results and discussion

Statistics on annual areas and yields

The field pea crop in southern NSW over the last twelve years has occupied on average 24,695 ha and yielded 1.22 t/ha, but the immense annual variation around these two figures becomes immediately apparent from Table 1. Underlying each annual average in this table are further equally large yield variations depending on which shire the crop was grown (Table 2). Shires were therefore grouped into common categories according to yield as follows: yield group A, >1.5 t/ha (mean 1.64); B, 1.1-1.5 t/ha (mean 1.33); C, 0.9-1.1 t/ha (mean 1.02); D,<0.9 t/ha (mean 0.82). Thus, the highest yielding shires (group A), as might be expected, are located in the higher rainfall zones in the east, ?while the lowest yielding shires (grouped D) are located in the drier areas westward.

Table 1. Historical performance of commercial field pea crops in southern NSW

Year	Hectares	Ave Yield
1984	2,097	1.13
1985	5,065	1.28
1986	16,364	1.51
1987	38,862	1.40
1988	45,751	1.19
1989	25,547	1.09
1990	26,319	1.26
1991	40,641	1.06
1992	29,295	1.46
1993	25,080	1.56
1994	23,743	0.32
1995	17,570	1.41
Average	24,695	1.22

Table 2. Regions and shires of field pea production in NSW based on ranking average shire yields over 12 continuous seasons (1984-95)

Average annual plantings for each region (Table 2) show group D, the lowest yielding zone, to have by far the largest proportion of the crop (41%), but conversely group A, the highest yielding zone, to have the smallest proportion (14%). Further analysis of these trends are depicted in Fig. 1 where the proportion of the crop sown in each of the four regions is graphed on an annual basis over 12 years (1984-95). Clearly, the proportion of the crop in group D, while always high, has steadily increased since 1989. The reasons for this trend are unclear, particularly as crops grown in group D have recorded the lowest yields. Perhaps the current tall scrambling varieties are better suited to these drier climates but when moved to the east, become too vegetative and too rank, resulting in relatively greater disease, lodging and harvest problems. Also, the new canola and lupin varieties are agronomically better suited and grow more erect in these more favoured environments.

Paddock performances using data from TOPCROP

Information on 26 field pea paddocks accessed from the TOPCROP database for the Parkes region in 1993 (1, 4) shows enormous variations in yield from 0.63 to 2.6 t/ha (average 1.37 t/ha) and gross margins from $-106 to $335 /ha. This further confirms the highly variable performance of this crop, even when grown within the same region and season.

The most important feature of this database is the explanations given by growers for possible causes of this yield variation (Table 3). For example, weed and insect control, low disease levels and a favourable springs were conditions frequently associated with high yields while waterlogging, weeds and powdery mildew frequently reduced yields. These comments need to be seriously considered when formulating extension and research activities.

Table 2. Regions and shires of field pea production in NSW based on ranking average shire yields over 12 continuous seasons (1984-95)

SHIRE	Annual Area (ha)	Yield (t/ha)		Annual Area (ha)	Yield (t/ha)
Yield Group A (>1.5 t/ha)			*Yield Group C (0.9-1.1 t/ha)*		
Bathurst	14	1.71	Berrigan	260	1.08
Blayney	33	1.58	Bland	1585	0.96
Conargo	39	1.52	Corowa	366	0.93
Cootamundra	257	1.81	Griffith	257	0.92
Cowra	365	1.62	Lockhart	571	0.95
Harden	122	1.65	Murrumbidgee	68	1.03
Junee	1153	1.53	Parkes	1623	1.02
Wagga Wagga	562	1.68			
Young	946	1.72			
TOTAL	*3,490*	*1.64*	*TOTAL*	*4,731*	*0.98*
Yield Group B (1.1-1.5 t/ha)			*Yield Group D (<0.9 t/ha)*		
Caborne	553	1.48	Carrathool	4678	0.85
Coolamon	980	1.27	Dubbo	144	0.83
Culcairn	514	1.21	Lachlan	364	0.58
Forbes	1839	1.33	Murray	670	0.89
Gundagai	55	1.21	Narrandera	839	0.84
Hume	212	1.34	Urana	771	0.58
Jerilderie	39	1.36	Wakool	2707	0.82
Leeton	13	1.48			
Temora	686	1.22			
Weddin	1342	1.40			
Wellington	68	1.31			
TOTAL	*6,300*	*1.33*	*TOTAL*	*10,172*	*0.81*

Farmer interviews - ideas to increase yield stability

In this study, four farmer interviews were conducted with the aim of identifying in greater detail other important technological, environmental and sociological issues faced by field pea growers which may ultimately lead to further increases in yield stability of this pulse and in overall profitability of winter crop rotations in southern NSW (4). The farmers interviewed were experienced pulse growers.

Table 3. Factors recorded by growers that influenced yield of their field pea crops at Parkes in 1993. The number of growers recording each factor for a given paddock is given as a score.

Factors that decreased Yield	Score	Factors that increased Yield	Score
Poor seedling vigour	1	Weed control	5
Wet harvest	1	Excellent spring	3
Lodging	1	Direct drilling	1
Waterlogging	12	Little disease	4
High sowing rate	1	Heliothus control,	2
Late sowing date- 13/7	1	Variety choice- Alma>Cressy Blue	1
Low plant population	1		
Weeds	6		
Heliothus	2		
Powdery Mildew	7		

Farmers were asked two sets of questions; firstly the issues concerning day to day management of field peas and secondly the role of peas and other pulses in their cropping rotations. These questions addressed issues such as why farmers grow pulses, how they deal with a crop that requires different management from cereals and tips that new growers may find useful.

Pulses were grown to extend the cropping rotation, provide a disease break in cereals, as a source of nitrogen, to increase soil friability, allow rotation of herbicides and insecticides, to spread the demand for sowing and harvesting over a greater time period, to provide a weed-free source of sheep feed, provide stubble for summer/autumn stock feed, as a reserve for fluctuating incomes (particularly as a money spinner during a drought as pulses are easily stored) and to increase the yields of following wheat crops.

The growers interviewed perceived that farmer resistance to growing the crop frequently centred around issues such as pulses are technically too demanding in terms of both management and marketing. Comments included yields are too unreliable, too many insect and disease strategies are required, seed is too costly in the first instance, they have a general lack of suitable on-farm storage and these crops can be too time consuming, particularly at sowing when time is at a premium.

Some useful tips for new pulse growers included; speak to as many experienced growers as possible, learn as much as you can about the crop before growing it, pay as much (or more) consideration to pulse crops as to other crops, do not compare gross margins on a one-year basis, rather consider their value to the whole rotation, start with a small acreage, do not grow the same pulse within three or more years on the same paddock, harvest pulses on time and not when cereals are finished and select the best paddocks to grow these crops as poor results can be traced to poor paddock selection in the first place. By placing due consideration to these issues, factors such as weeds, waterlogging, disease, poor establishment, shattering and loss of seed quality can be minimised or eliminated, and ultimately, yield and gross margins increased. Pulses are best placed later in a crop rotation where soil N fertility is declining and other more N-demanding crops are relatively less suited.

Conclusion

The profitability of the field pea crop and its acceptance by farmers in southern NSW would be greatly enhanced if yields between seasons, across regions, within a region, between farmers and even between paddocks on the same farm could be reduced. ?While very little can be done about climatic changes and its effects under dryland farming conditions, considerable gains can be made to reduce variability within a region, between farmers and between paddocks on the same farm. These largely centre around thorough management practices associated with a sound understanding of the crop, appropriate selection of

paddocks, well planned cropping rotations and a desire to produce the highest quality grain to achieve price premiums.

Since the crop is grown over widely differing climatic zones in southern NSW (as represented by the four different yield groups in this paper), management packages need to be tailored accordingly. New varieties need to be targeted for the different regions - for example, shorter more erect types for the higher rainfall regions to overcome disease, lodging and harvesting problems (E.L. Armstrong, unpublished data).

References

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