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Field peas in the wheatbelt

R J. French

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Plantings of lupins in the Western Australian wheatbelt increased rapidly in the late 1970s and early 1980s as improved varieties became available and farmers realised the benefits to be gained from growing grain legumes. Grain legumes are useful not simply as alternative cash crops. They provide ‘fixed’ atmospheric nitrogen to following cereal crops and act as a cleaning crop to break cereal disease cycles. They are also valuable sheep feed.

Large areas of the wheatbelt, however, have soils unsuitable for lupins. These are mainly heavy textured soils such as the red salmon gum/gimlet sandy clay loams of the eastern wheatbelt and the grey clays of the southern wheatbelt, but include some duplex soils in the low rainfall areas of 275 to 325 mm per year. Many of these soils recently have been cropped continuously to cereals and so would benefit from a suitable grain legume which would also restore soil nitrogen levels and break cereal disease cycles.

In 1975, throughout the wheatbelt, the Department of Agriculture began a comparison of several alternative legumes. The crops included field peas, faba beans, chickpeas, lentils and various vetches. Field peas proved the most consistent and highest yielding alternative legume crop tested.

A field pea agronomy project funded by the Wheat Industry Research Committee of Western Australia started in 1984 to assess the potential of this crop and to determine how it could fit into wheatbelt farming systems.

Potential for field peas

Trials at Merredin Research Station in the past three seasons (Table 1) showed that field peas grew well on a wide range of soils but preferred the heavier textured soils. In contrast, lupins grew best on light soils.

Peas grown on heavy soils in 1984 and in 1986 yielded up to 50 per cent more than peas grown on medium soil, but in the much drier 1985 season they yielded nearly 80 per cent more when grown on medium soil. The effect of seasonal variation on yield can be reduced by expressing yields as a percentage of the wheat yield on the same site. The results then show that peas are best suited to heavy and medium soils, and lupins to light soils. Peas grow poorly on light acid soils such as Wodgil soils.
Field peas have shown good yield potential at many sites throughout the wheatbelt (Table 2). Wheat yields also are often better after a pea crop (Table 3). On three soil types at Merredin in 1985, wheat yields improved following a grain legume crop than after a cereal crop. On the good light soil there was no increase in wheat yield because the season was extremely dry, resulting in the crop being unable to fulfil its yield potential. However, there was an earlier increase in vegetative growth. Grain nitrogen levels were similar in wheat crops grown after peas and lupins on all soil types. The increased wheat yields following grain legumes on heavy and medium soils are encouraging as these soils generally do not respond well to applied nitrogen. Further trials are under way to study the place of field peas in rotations with cereals.

Field peas out-yielded lupins in some of these trials, even on light soils, probably resulting from the dry finish experienced at Merredin in the 1984 and 1985 seasons. Peas appear more drought tolerant than lupins, as shown by the better relative lupin yields in 1986 and by data from trials conducted throughout the wheatbelt in 1985. Peas yielded better than lupins on sand over clay soils when growing season rainfall was below about 280 mm, but lupin yields were better on the same soils when growing season rainfall was above this figure (Figure 1). This is probably because peas flower earlier than lupins, avoiding some of the hot dry conditions at the end of the growing season.
Fitting peas into farm programmes

Seeding

Field peas are most likely to be grown on farms with a high proportion of cropping as a legume pasture phase reduces the need for a grain legume. Pastures also allow weeds to build-up which are more difficult to control in peas than in cereals.

At seeding time, therefore, farmers need to decide on the order in which to sow various crops. Lupins, being more sensitive to late seeding than cereals, are usually sown first. Field pea yields also decline with delayed seeding, but not as quickly as lupins. The yield responses of field peas and lupins to various seeding times were compared at Merredin in 1984. Pea yields declined by 12 kg/ha/day when seeding was delayed from mid-May to mid-June. Lupin yields declined by 24 kg/ha/day over the same period.

The yield response to time of seeding trials varied in 1985. In low rainfall areas of the wheatbelt pea yields declined with delayed seeding at an average rate of 12 kg/ha/day. In wetter areas in the southern wheatbelt, such as at Katanning and Jerramungup, delaying seeding from late May to early July had little effect on yield. In the northern wheatbelt pea yields seem to be more responsive to delayed seeding. Lupin yields declined rapidly with delayed seeding at all sites which produced reasonable yields, with an average rate of yield reduction of 26 kg/ha/day. Thus lupins should be sown before peas on farms where both crops are grown.

The rates of reduction of pea yield with delayed seeding are similar to those for wheat (for which 10 kg/ha/day is a generally accepted figure). Thus peas can be sown before or after a main cereal programme.

Weed control

Weed control is most important. Field peas do not compete well with erect-growing weeds, as early attempts to grow them at Merredin showed. Because chemical control of weeds in peas is not totally reliable, the best strategy in most seasons is to delay seeding until after a complete weed germination. Although some potential yield will be lost, weeds can then be killed effectively by cultivation or a knock-down herbicide. Good weed control in preceding cereal crops to reduce the weed burden is also important.

Grass control is less of a problem than broad-leaved weed control because chemicals such as trifluralin, Hoegrass® and Fusilade® are safe to use on peas. The use of Fusilade® to control brome grass and barley grass will reduce the levels of these weeds in subsequent cereal crops. Most herbicides used for broad-leaf control also damage peas.

Doublegee is a major problem in field peas. Besides competing with the crop it can contaminate the harvested seed. The pre-emergent chemical diuron is the best choice for controlling doublegee and other broad-leaved weeds. When used at a rate of 1.5 L/ha diuron will control capeweed, but some doublegee usually survives. In wet seasons, however, this rate may cause noticeable crop damage. Higher rates often cause damage. Other broad-leaf herbicides such as metribuzin, Tribunil® and MCPA can also cause crop damage at recommended rates.

Harvesting

Peas mature about two weeks earlier than lupins so there should be ample time to harvest them before other crops are ready. Peas should be harvested as soon as the seed is hard because pods of some varieties shatter when left too long. Pea weevil, if present, also can leave the pods before harvest, leading to establishment of an infestation of this pest in following years.

Peas are usually harvested direct with an open or closed front header. Crop lifters are necessary because peas lodge at maturity, forming a thick mat which cannot otherwise be picked up. Harvester speed must be slower than that used for cereals to avoid picking up rocks and roots, but it must be fast enough to maintain the flow of material into the machine.
Varieties

The introduction of new varieties should increase the potential yield of field peas in this State. Derrimut, which was released in Victoria in 1964, yields best in the dry parts of the Western Australian wheatbelt. It has been replaced in the dry parts of Victoria and South Australia by the variety Dundale, which flowers slightly later than Derrimut. Dundale does not always yield as well as Derrimut in Western Australia. Derrimut, however, also has some deficiencies. The seed is small and dimpled, making it unsuitable for splitting.

If Western Australia wants to export field peas it is probably worth accepting the slightly lower yield of Dundale for its suitable seed. Other varieties such as Collegian, Pennant, Buckley and Dun are also suitable for splitting, although they do not always yield well in variety trials.

The newly released South Australian varieties Alma, Maitland and Wirrega are also suitable for splitting, but have not yet been extensively tested in Western Australia. However, they flower later than is ideal for our conditions. Wirrega, in particular, has performed well in some trials but not so well in others. The Department of Agriculture is therefore not yet in a position to recommend this variety.

A BRIEF HISTORY

The field pea is not a new crop to Western Australia. The ability of legumes to improve the poor nitrogen status of our soils was soon recognised by the early farmers. An article on green manuring in the Journal of Agriculture, March 1900, stated that “Garden and field peas are too well known to need comment”. Peas were not only used for green manuring. At a producers conference in Perth in 1910, Mr A. E. Clifton of Brunswick expounded the virtues of field peas. His opinion that “it is a crop that would be more frequently grown if its value were better understood” would be shared by many modern producers. Mr Clifton rarely harvested peas but turned store sheep and pigs on to them in December. This seems to have been common practice.

Peas were also used to make hay. The Journal of Agriculture in 1924 contained a report on long term rotation experiments at the Merredin and Chapman Experimental Farms. Several of the rotations at Merredin included peas as a break crop which were cut for hay, but plantings were discontinued after 1923. Yields were unreliable, probably because of heavy infestations of wild oats and wild mustard which could not be controlled.

Important innovations in pea breeding in the past decade have been the introductions of the semi-leafless character in pea plants and improved stem stiffness. Both these characteristics help to make harvesting easier. Semi-leafless plants have more tendrils than conventional plants and tend to support one another at maturity. Stiff stems help the plants to remain more upright when mature. Breeding for disease resistance appears possible. Derrimut forms only one pod per reproductive node on the stem whereas most other field pea varieties form at least two. This severely limits the rate at which potential yield is formed during flowering, although extra branching by the plant may be able to compensate. These genetic characteristics, to be useful in Western Australia, would need to be incorporated into varieties that are adapted to our environment.

There are no pea breeders in Western Australia. However, Department of Agriculture plant research officer, G. H. Walton, is monitoring the most promising lines from pea breeding programmes elsewhere in Australasia. Lines with early maturity (70 to 90 days from seeding to flowering; similar to Derrimut and Dundale, but earlier than Dun) and incorporating genes that curtail vegetative growth (semi-dwarf Pea seed was used mainly as stock feed. Farmers grazed stock on the mature crop during summer rather than harvest the seed. Heavy infestations of pea weevil were a major problem with this practice, as it is in some areas today.

The pea weevil was first recorded in this State in 1932. It spread so rapidly that in 1933 it was made an offence to supply field peas unless they had been “fumigated with carbon bi-sulphide in such manner as effectively to render the same free from the disease of pea weevil”. By 1938, the pea weevil had rendered the growing of field peas for seed production unprofitable in the South-West dairy areas and pea production shifted towards the Northam region (Table 4).

Annual plantings of field peas peaked at nearly 6 000 ha in the late 1940s, then dropped to between 1 500 and 2 000 ha for the next 20 years. Some 3 000 ha were sown in the late 1960s, when wheat prices were low, but only small areas were sown in the 1970s. Some 4 000 ha were planted to field peas in the wheatbelt in 1985-86.
plants) have better pod set than existing lines. Varieties with cream, smooth seed which can be used as sources of domestic protein for humans and animal feed, and as an export pulse for human consumption, will enhance our market prospects.

Disease and pest status

The main disease of peas in this State is the black spot complex caused by the *Ascochyta* group of fungi. Black spot occurs in areas of more than 400 mm average annual rainfall where peas have been grown for some time, but it is not yet in the new growing areas further east. Whether this is because these new areas are too dry for the fungus to thrive, or because there has been insufficient time for populations to build up, is not known. Black spot can be introduced on contaminated seed. Farmers wanting to plant peas should buy disease-free seed if possible. Where the disease is present crop rotation can reduce its effects. Peas should not be grown more often than once every three years on the same land.

Red-legged earth mite and lucerne flea attack the pea crop when it is establishing, and native budworm can cause considerable damage during podding.

Parallel to this increase in sowings has been a decided shift in the pattern of production (Table 4). The increases have been most dramatic in medium to low rainfall areas of intensive cropping as farmers seek to stabilise their cropping systems. In the medium to high rainfall areas where peas have traditionally been grown, plantings have either stabilised or declined over the past 30 years.

The largest proportionate increases have been in the eastern wheatbelt (covered by the Lakes and Campion statistical subdivisions) and the Esperance area (in the South-East statistical division). The trend is also evident within the Avon subdivision where, in 1955-56, York shire accounted for 37.4 per cent of the area planted to field peas in the Avon subdivision, and Wyalkatchem shire none. In 1985-86, Wyalkatchem shire had 67.6 per cent of Avon's peas and York about 3 per cent.

In 1986, the Department of Agriculture estimated 8 000 to 9 000 ha of field peas were sown in Western Australia and we believe the eastward trend for new plantings has continued.

| Table 4. Distribution of field pea sowings |
|-----------------------------|-------|-------|-------|
| Statistical division       | 1925-26* | 1955-56 | 1985-86 |
|                            | ha     % total | ha     % total | ha     % total |
| Perth                       | 19     1.3 | 15     0.4 | 236     16.4 |
| South-West                  | 624    43.5 | 292    7.2 | 306     14.1 |
| Lower Great Southern Pallinup | 306   14.1 | 1091   26.8 | 1091   26.8 |
| King                        | —      — | 58     1.4 | 58     1.4 |
| Total                       | 236    16.4 | 1149   28.2 | 1149   28.2 |
| Upper Great Southern Williams Lakes | 580  26.7 | 310    7.6 | 24     1.1 |
| Total                       | 274    19.2 | 604    27.8 | 520    12.8 |
| Midlands                    | 197    9.1 | 113    2.8 | 197    9.1 |
| Avon                        | 875    40.4 | 1296   31.8 | 875    40.4 |
| Campion                     | 20     0.9 | 434    10.7 | 20     0.9 |
| Total                       | 282    19.6 | 1844   45.3 | 1844   45.3 |
| South-East                  | 16     0.8 | 219    5.4 | 16     0.8 |
| Central                     | —      — | 31     0.8 | 31     0.8 |
| Western Australia total     | 1435   100 | 4070   100 | 1435   100 |

* The break-up of the State's crop for 1925-26 is approximate because the boundaries of statistical divisions have changed substantially since then.
The potentially most damaging insect is the pea weevil which can cause large yield losses. The female beetle lays bright orange eggs on the surface of young pods. After the eggs hatch, the larvae burrow through the pod wall and enter a seed. They eat out the inside of the seed as it develops, then pupate inside the seed. This makes chemical control of the weevil difficult and expensive, and greatly reduces the value of the seed on the world market. Agitating the seed during harvest, or planting infested seed, frees the beetles, which then over-winter in debris, shrubs or trees until the next crop is flowering.

Chemical sprays will control the adult beetle only, not the eggs and larvae. If adult pea weevil is found the crop should be sprayed with cypermethrin, endosulfan or maldison ULV when the first flowers begin to wither, and before egg laying starts. If only the edge of the crop is affected, a 30 m wide perimeter spray should protect the crop.

Pea weevil is found in areas around York, Narrogin and Katanning, but extensive crop sampling in 1985 and 1986 failed to detect it in eastern parts of the central wheatbelt. In the south, pea weevil has not been found further east than Borden. It could easily be spread, however, by bringing contaminated seed into a previously non-infested area. Pea seed should be fumigated with aluminium phosphide before being brought into a non-infested area.

Markets

The future for marketing field peas in Western Australia looks bright. The composition of the seed is such that it can be used in poultry rations more easily than lupins. It also would substitute for soybean meal presently imported from the U.S.A. at a cost exceeding $300 a tonne. Although such prices could not be expected for field peas since they have a lower protein content than soybean meal, local poultry producers have offered up to $180 per tonne. One major poultry producer has indicated a requirement for 7 000 tonnes of peas per year. As supplies increase, other producers and feed millers would become interested in field peas, further increasing demand.

Peas can be used in pig rations and for sheep feed, but they would be competing with lupin seed. Pea seed has a better amino acid balance than does lupin seed, and this might give it a slight premium over lupins for pig rations, but its lower protein content would make it less attractive for sheep feed.

The State's domestic market for field peas could reach 20 000 tonnes per year, with additional large amounts being used on-farm.

Further reading


