Grain legumes for low rainfall areas

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The benefits of growing grain legume crops in rotation with cereals include an increase in soil mineral nitrogen (1) and decreased numbers of soil-borne cereal pathogens, which result in increased profitability when compared with continuous cereal cropping.

Most temperate grain legumes are grown in areas receiving at least 375 mm annual rainfall, and several studies (2,3,4) have compared a range of grain legume species in these areas. A 3-year study, completed in 1986 sought grain legume species which are adapted to low rainfall (<375 mm) Mediterranean environments.

Method

In addition to breeders' lines of lupins and peas, about 700 lines of 45 legume species (mostly Vicia spp. and Lathyrus spp., i.e. vetches) were obtained from collections in Australia and overseas. After quarantine and seed increase, lines were grown in small plot trials at ten sites in South Australia over three seasons. Characters assessed included grain yield and protein, days to flowering and maturity, lodging, crop height and grain loss prior to harvest.

Results and Discussions

In the 14 trials sown at low rainfall sites (153-320 mm growing season [April-October] rainfall) in 1984 and 1985, the highest yielding line was a pea in 5 trials, a faba bean in 2 trials, common vetch (Vicia sativa) in 2 trials, and narbon bean (V. narbonensis), bitter vetch (V. ervilia), flat-podded vetch (Lathyrus cicera), narrow-leafed lupins and albus lupins each in one trial.

Peas showed best adaptation to low rainfall environments with vigorous early growth and consistent yields, although lodging may prevent efficient harvesting with commercial machinery, particularly in years of sparse growth. Likewise, wind erosion after harvest may be a problem on unstable soils.

Narbon beans (Vicia narbonensis) are erect/semi-erect plants, very similar in appearance to the faba beans but with weaker stems and a tendril on each leaf tip. The five lines tested show good potential, and a further 180 lines are awaiting testing.

Lupins yielded well on lighter textured soils with surface pH as high as 8.5, but grew poorly or died on soils with more than 5-10% CaC0. The deep tap root of lupins enabled them to survive dry periods in pring.

Although faba beans often yielded well, especially in seasons with above average rainfall and/or cool spring, pods do not set in hot/dry conditions, and pods are often too low on the plant to be harvested with commercial machinery.

Chickpeas and lentils were too short in dry conditions and yielded poorly. While some of the vetches yielded well they were generally inferior to peas and suffered the same prostrate habit as peas at maturity.

There are no established markets at present for narbon beans and vetches; however, there is good demand for the other species both locally and overseas.

Overall, peas showed most potential in low rainfall areas, while on lighter soils with low CaCO content lupins may be superior. While faba beans are too risky in areas receiving less than 375 mm annual

rainfall, narbon beans with a shorter growing season appear to have good potential and are worthy of further development.

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