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Weed research pays off

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Weed control trials indicate the effectiveness of modern herbicides.

Until 1973 no herbicides could be recommended for weed control in lupin crops in Western Australia because too few research results were available. Today, nine herbicides can be used for this purpose in at least 15 ways. This is a result of research conducted since 1970 by the Department of Agriculture together with private consultants and the agricultural chemical industry.

The outlook for the future is that the number of alternatives for controlling weeds in lupin crops should increase, and rapid advances in research with new herbicides can be expected.

Lupins

Background
Before 1972 narrow leaved lupins (Lupinus angustifolius) were grown mainly on new land where weeds were not a problem, but a rapid change was in progress. More lupins were being sown each year in rotation with cereals and clover. The lupin growing industry reached a peak in 1975 when 122,000 hectares were sown in Western Australia.

Similar changes were occurring in Victoria and New South Wales, where herbicide research started in 1971. The first published report on the use of herbicides in Australia appeared in 1973. By 1976 Mr J. Allan* had achieved selective weed control in lupins with several herbicides. Those that emerged as recommended products for this purpose in Western Australia were simazine, diuron, trifluralin, diallate and alachlor.

Simazine was regarded as the best product for simultaneous grass and broad leaved weed control. It was recommended for use in the southern wheatbelt.

Most of the interest in grain lupins was in the southern cereal growing areas, where trials had shown that grain yields usually increased when herbicides were used. Diuron was found to be particularly effective against broad leaved weeds such as radish and doublegees while the other products would control annual ryegrass successfully.

Simazine was not strongly recommended for use on sandy soils or in the central and northern wheatbelt because its performance proved to be erratic. It caused crop damage frequently and increased grain yields only occasionally.

Interest in growing lupins waned from 1976 until 1979-80. Then wheat growers in the northern wheatbelt looked again to lupins as an alternative to sub. clover, particularly as a source of nitrogen for growing wheat. Much of the area was suffering the serious effect of drought, clover pastures were deteriorating and sheep were being sold off to graziers in the south.

Favourable prices for lupin grain were a further incentive to farmers in the former drought areas to plant lupins in rotation with wheat.

Furthermore the newly released lupin variety Illyarrie proved to be highly suited to the northern wheatbelt.

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Although farmers used some herbicides on lupin crops before 1978, the area sprayed was so small that no records of herbicide use were kept. In 1981 there was a big increase in the area sown and sprayed. Interest in lupin growing had spread to the central wheatbelt. Although about 60 per cent of the crop (116,000 ha) was sprayed with simazine, 4000 ha was also sprayed with trifluralin, with favourable results.

From 1976 onwards the research effort by Department of Agriculture officers and private consultants Mr Ralph Burnett at Watheroo and Mr Bill Roy at York as well as representatives of agricultural chemical companies in co-operation with farmers, had increased substantially.

**Research objectives since 1972**

Researchers anticipated in 1972 that lupins could be grown in rotation with cereals, and that farmers would require selective weed control measures. Since most interest in lupins at that time was in the southern districts and the south coast, the first objective was to identify herbicides that showed selectivity, particularly in these areas. Although trials in northern districts were included in the research programme, recommendations to use simazine and diuron were mainly directed at the southern areas where weed control with herbicides had increased grain yields by more than 70 per cent.

From the results of this programme, researchers concluded that lupins compete more successfully with weeds in northern areas and that herbicides did not increase grain yields reliably, therefore they should only be used on paddocks heavily infested with doulegleg and wild radish.

This was not entirely satisfactory because all the herbicides on trial were for pre-emergence application, so the challenge was to identify a serious weed problem in a paddock before weed emergence. Thus the recommendations were of limited use in northern districts, particularly as the growing season there is too short for farmers to wait for weeds to emerge to identify those areas that required spraying.

The next research objective was to look for products that offered selective post emergence weed control in the northern districts.

DNBP, Linuron® and Tribunil® were selected for further study from the 18 herbicides tested. It was established that Hoegrass® could be recommended for post emergence grass control. With the exception of Hoegrass®, poor crop tolerance was the reason why post emergence herbicides failed to gain acceptance.

Researchers then launched a study on simazine damage to lupins on the yellow sandy soils. They started trials on the effects of simazine and other recommended or promising products on all the lupin varieties being grown commercially. This showed that the narrow leaved *L. angustifolius* varieties such as Marri and Illyarrie had similar tolerance to herbicides.

They also showed the broadleaved variety Ultra (*L. albus*) was more sensitive to simazine and more tolerant to both Linuron® and Tribunil® than the narrow leaved varieties.

Meanwhile in 1977 Mr Burnett had started further trials to study the effect of applying simazine before seeding, after seeding and after crop emergence to lupin crops grown on soil types on which the highest incidence of simazine crop damage had occurred.

Up to this time two litres of simazine per hectare applied immediately after seeding, was the recommended method of use. Burnett’s results showed that less crop damage occurred if simazine was applied before seeding. This is how most of the simazine was applied in 1980. The results were satisfactory.

However, the main conclusions from the collective research effort were that while simazine performs somewhat erratically on yellow and white sandy soils of the Midlands and northern wheatbelt, and crop tolerance is highly variable, simazine is most likely to increase grain yields if the rate of application is reduced from 21 L/ha to a rate within the range of 1.0 to 1.5 L/ha.

Weed control is likely to be poor in crops sown dry on very weedy paddocks, but the infestation will be much lighter than if no herbicide is used. By reducing the rate of application on yellow white sands below 2 L/ha, farmers can reduce the risk of crop damage and increase the prospects of profitable grain yield increases in spite of the weeds that survive.

There may be a clash of operations if all lupins are sown after weeds emerge. However, even if lupins are direct-drilled into emerging weeds, seeding, particularly with a cultitrad or combine, can effectively reduce the weed infestation in the crop to a level at which it may be substantially, if not completely, controlled with simazine.

Thus farmers can make the best use of simazine by sowing the most weed-free paddocks first, and the weediest paddocks after the break of the season to gain the benefit of a cultivation to kill emerged weeds. If seeding operations after the break are unlikely to leave a weed-free soil surface, research results show that weed control and grain yields can be improved by applying simazine with a knockdown herbicide such as Spray Seed® or Roundup®, before seeding.

**New products and future research**

There are two products which have displayed a wide margin of selectivity in recent trials. They are SSSH 0860 and PP 009. Both require further field testing before registration can be approved.

SSSH 0860 is a pre-emergence root- absorbed herbicide that effectively controlled brome grass and annual rye grass in Western Australia in 1981. Results from elsewhere show that it is also effective against a wide range of broadleaved weeds.

PP 009 is a post-emergence leaf- absorbed herbicide for controlling grass weeds in broadleaved crops. It has the potential for selectively controlling brome grass in lupins more effectively than any other product now available, and demonstrated this in 1981.

Future research must concentrate on the development of products that offer total selective weed control from crop emergence until the lupins form a leaf canopy some four to eight weeks later.