

At each site, applied nitrogen increased the growth of both crop and weed, but had no effect on competition between the two. This suggested that competition was for some other factor.

It is hoped that similar data collected for a number of years will indicate a narrow range of weed densities above which economic increases in grain yield from crop spraying could be predicted.

#### CONTROL TECHNIQUES TO COUNTERACT THE PERSISTENCE OF ANNUAL RYEGRASS

G.A. Pearce

Department of Agriculture, Western Australia

The ability to produce large quantities of seed which germinates over an extended period each year has enabled annual ryegrass (*Lolium rigidum*) to become one of the most important and persistent weeds in crop situations. Practically none of the seed persists for more than one growing season and this presents an opportunity to control annual ryegrass by restricting seed development and destroying viable seed.

#### GRAZING

In a trial at Katanning in 1974 it was found that approximately 2400 seeds were present on each 400 square centimetres. In plots which had been heavily grazed throughout the winter and spring to prevent the development of seed heads, the number was reduced to about 110. Where a spray of paraquat was used to kill any flowering stalks that might have developed the number was further reduced to around 60. The most important period with grazing is in the late spring when flowering stalks are being formed, and it is unfortunate that this coincides with a spring flush of pasture growth. At this time very few farmers have sufficient sheep to maintain the grazing pressure required even if they concentrate on the paddocks to be cropped the following year. Because of this, the use of paraquat applied as late as possible but before any seed has matured is often worthwhile. The cost is much less than any chemical used for ryegrass control in crops, and the palatability of the feed is increased.

### BURNING

Burning ryegrass pasture over summer effectively destroys most of the viable seed but the time of burning influences the efficiency of this technique. In the field trial referred to above, it was found that when annual ryegrass pasture was burnt, the seed lying on the ground had a better chance of survival than that remaining in the seed head. The seed steadily sheds, commencing in early December. Sampling indicated that by the end of December about 25 per cent of the seed had shed while a month later the figure had increased to 50 per cent. It was found that burning an ungrazed area on 20th December left one per cent viable seed, while burning on 20th January, left five per cent viable seed surviving. There are practical problems associated with burning during the summer and very few farmers are willing to sacrifice the loss of feed. Grazing during the summer and burning in the autumn is less effective as much of the ryegrass seed is trodden into the soil, and there is less material to provide a hot fire. However with only light grazing, an autumn burn is still worthwhile.

### CULTIVATION

When the germinating rains commence, the speed of germination is governed by a number of factors. One of these is the moisture relationship. Pot trials have shown that seed lying on the surface of the soil germinates at a slower rate than when it is lightly covered with soil. Daily watering counteracts this effect, but under field conditions the seed may only be moist for a few days before it dries out and the germination process either stops or slows down. Under these conditions the maximum germination may not be reached for 28 days while with adequate moisture the same germination can be obtained in 7-8 days. Covering the seed with about 1.5-cm soil keeps the seed moist and thus produces a faster and more even germination. Under field conditions this can be achieved by a shallow cultivation at the end of the autumn period. The seed which has not germinated within 7-10 days should be ploughed in to a depth of at least 9 cm and any subsequent cultivation should be at a shallower depth.

### CONCLUSION

Using as many of these techniques as possible a much reduced population of ryegrass can be expected in the crop. If it is planned to use a herbicide the chances of success will be greatly increased.