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HOW IMPORTANT ARE WILD OATS?

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Trials have shown that wild oat competition is more important in a high yielding wheat crop than it is in a low yielding one. The extent of this competition is described in this article.

WILD OATS tend to grow best on heavy, fertile land. They can be a particular problem in wheat crops where soils of this type predominate.

Although no definite figures are available it is not unreasonable to assume that at least half a million acres of land in Western Australia could be affected by wild oats each year. This figure could be doubled in very wet years, when normal cultural control of wild oats becomes more difficult.

While the potential for wild oats remains fairly static from year to year, their significance has been rapidly increasing. There are several major reasons for this.

Most of the increase in wild oats has come from the reduction of pasture competition with the introduction of multiple cropping techniques.

Secondly, the widespread use of herbicides such as 2,4-D and linuron has led to marked improvement in the control of broad-leaved weeds. This too has enabled wild oats to thrive under reduced competition.

Even more significant is the effect of modern harvesting machinery. The use

The density of the various wild oat treatments was compared in long plots planted at departmental research stations. These provided visual as well as detailed evidence of the effect of wild oat competition on wheat crops

of wide cutting auto-headers has resulted in many wild oat-infested wheat crops being harvested two to four weeks earlier than would previously have been possible. In this way the wild oat seed is collected before it sheds. Where this happens the value of the wheat may be reduced. In the 1966-67 season it was estimated that some 2½ million bushels of wheat were subject to dockage for wild oat content.

Wild oats can set an enormous number of viable seeds—about 250 to 500 per plant. A medium infestation of some 50 plants per square yard would yield a potential population for the next year of some 6 million plants per acre. This is at least ten times the number of wheat plants in an average crop.

Experiments

Recent research has been designed to evaluate the effect of wild oats on wheat yields.

Thirteen levels of wild oat infestation were superimposed on three sowing rates of wheat planted at Department of Agriculture research stations over two years. The wheat sowing rates were chosen to approximate three typical crop situations. The trials were designed to investigate the competitive effect of the wheat on the wild oats. Previous trials had shown that this effect could be important.

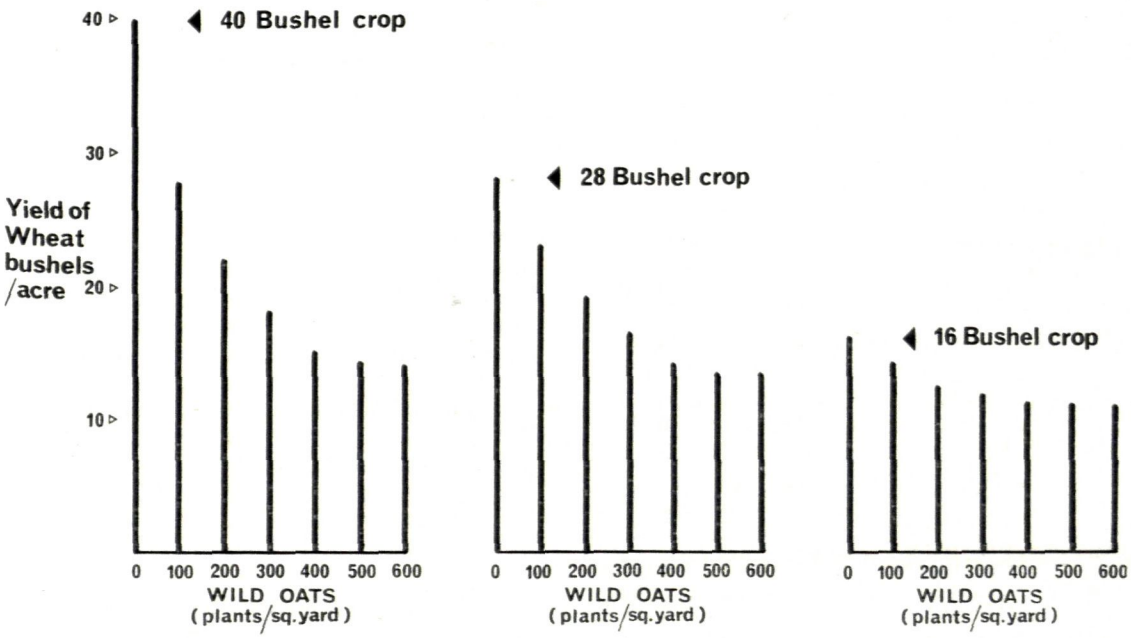
The results of the trials were statistically analysed and the correlation of the degree of wild oat infestation with the yield of wheat was found to be highly significant.

Crop potential

The comparison showed that wild oats are much more important in a high yielding wheat crop than in a poorer one. The significance of wild oats appears to depend mainly on the ability of the wheat plants to compete with the weeds. This in turn is controlled by external factors such as climate, soil type and availability of nutrients.

The trials indicated that, where a wheat crop can be expected to yield less than 20 bushels per acre, it is doubtful whether any economic advantage could be obtained from the removal of wild oats. On the other hand in a crop with a potential yield of 40 bushels, infestations of wild oats as low as 50 plants per square yard become significant, causing the wheat yield to be reduced by about 7 bushels per acre.

Where there are more than 400 wild oat plants per square yard the yield of wheat



The reduction in the yield of three typical wheat crops caused by various densities of wild oats. The height of each column is equivalent to the yield of wheat obtained under competition from the number of wild oats shown

is unlikely to be much further reduced by an increase in the wild oat density.

Wild oat competition

The illustration shows the large reduction in wheat yield caused by a relatively low infestation of wild oats in a 40-bushel crop. The same infestation has a negligible effect in a 16-bushel crop.

The experiments have shown that dense infestations of wild oats cause a larger loss in a heavy crop than in a light one. The extent of this loss is shown in the table below.

Reduction of yields from "heavy", "good" and "average" wheat crops affected with varying infestations of wild oats

Potential crop yield (bushels of wheat per acre)	Wild oat infestation (plants per square yard)	Crop yield reduction (bushels per acre)
Heavy crop (35–40 bushels per acre)	10	1
	15	2
	25	3
	30	4*
Good crop (25–30 bushels per acre)	20	1
	40	2
	60	3
	80	4*
Average crop (15–20 bushels per acre)	50	1
	100	2
	170	3
	270	4*

* Equivalent to the cost of herbicide treatment.

Chemical control

Two herbicides are now available for the control of wild oats in wheat crops. These are:

TRI-ALLATE—marketed as Avadex BW and distributed by Monsanto Chemicals (Aust.). It should be applied before emergence of the wild oats; and

BARBAN—marketed as Carbyne and distributed by Amalgamated Chemicals Pty. Ltd. and Shell Chemical Co. It should be applied after the wild oats have emerged.

The use of these chemicals was discussed in the April, 1967, issue of the *Journal of Agriculture* and reprints are available as bulletin No. 3496. Both herbicides will control wild oats if they are used according to recommendations. Both barban (Carbyne) and tri-allate (Avadex BW) are relatively expensive to apply, costing about $4.50 per acre. This is equivalent to about 4 bushels of wheat per acre. In Western Australia most wheat crops yield less than 20 bushels per acre so that herbicide use is not economic where wild oat infestations are not very heavy.

The following Table gives a guide to the minimum number of wild oat plants per square yard which should be present before herbicide use is considered.

Guide to the need for chemical control of wild oats

Wheat crop potential	Wild oat density before herbicide should be considered
	Plants per sq. yard
Heavy (35–40 bus. per acre)	30
Good (25–30 bus. per acre)	80
Average (15–20 bus. per acre)	270

It is obvious that herbicide treatments would be more readily acceptable if their cost was lower.

The figures emphasize the importance of estimating potential crop yields before herbicide treatment is considered. This of course becomes more difficult when a pre-emergence material such as tri-allate is to be used.

Recommendations

- Cultural treatments should be designed to kill as many weeds as possible and to suppress those remaining in the crop. The initial ploughing should be delayed until a good emergence of weeds has occurred. Where most of the weed seeds are at or near the surface, such as in a first crop, this ploughing should be deeper than usual. Subsequent cultivations should be much shallower.
- Where the break of the season permits some delay in seeding the time can be used to give additional weed killing cultivations.

When wild oats become as dense as they are on the right it is often necessary to consider the use of herbicides. This treatment is not always economical where the wheat crop does not have the potential to yield highly

- Crop vigour and potential yield can be improved by sowing early-maturing varieties at a shallower depth and at a higher rate of seeding than normal. This will lessen the end-of-season stress caused by retarded growth resulting from weed competition. Shallow-sown crops tend to emerge quicker and grow more strongly when faced with weed competition. At least 60 lb. of wheat per acre is suggested where the weed problem is likely to be severe.

- The most important factor to consider is the ability of the crop to compete with wild oats which survive the presowing cultural treatments. If it is anticipated that the crop will be high yielding, herbicide treatment should be considered. This treatment is unlikely to give an economical return in a low-yielding crop, although some advantage will be obtained in future years from the reduction of wild oat seed set.