

PROTECTING THE WHEAT CROP

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At the time of sowing wheat, farmers also should be deciding on an overall plant protection programme. The earlier this is done the more control strategies are available.

CROP PROTECTION STRATEGIES

Varieties

The variety grown is chosen more in relation to the potential or actual market outlet for the grain, but obviously taking yield and quality into account. However, it is worth thinking about varieties that resist disease, for the cheapest and best means of disease control is the use of such resistant varieties. For example:

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| Takahe and Arawa | - | mildew resistant |
| Rongotea and Oroua | - | leaf-rust resistant, and
some resistance to speckled
leaf blotch |
| Aotea and Takahe | - | some resistance to eyespot
(use as second crops). |

These varieties should be chosen if these diseases have been a cause of serious yield losses in the past.

Seed Treatment

Grain for seed purposes can be saved from your own crop or can be obtained from merchants as certified seed (of which there are three grades). All seed wheat should be treated with a fungicide. Seed from merchants will be treated. Farm-saved seed may be sent to merchants for treatment, be treated by mobile operators, or by the farmer. It is known that some farmers have used untreated seed which has come from a crop grown the previous year from certified seed. While farmers may do this, it is not a good practice, and certainly should not be done more than once with any line of seed.

When it comes to seed treatment chemicals, there are four available. Orthocide 75 and Dithane M45 will control stinking smut (bunt) and protect the plants against some soil-borne disease organisms. Vitaflo 200 and Baytan F17 will do the same but also control loose smut, an infection that can be present in the seed. Baytan F17 seed treatment also controls powdery mildew and leaf rust, when these are present in the young crop. This is not likely in autumn-sown wheat, but can assist their control in late-sown spring wheat and barley.

Rotations

Many disease organisms can survive in the previous crop residue, particularly take-all, eyespot, mildew and speckled leaf blotch. Hence the strong recommendation to burn the stubble and to avoid growing wheat after wheat wherever possible. Even where a good burn is obtained, disease inoculum may persist in the headlands, where diseased straw has been ploughed in to form a firebreak. It is possible to grow two wheat crops in succession or even three, but the increase in amount of take-all, eyespot

and such insects as Hessian fly will cause real problems and yield loss in these and subsequent crops. The break between wheat crops in a rotation should be at least two years without wheat and barley, because take-all also survives on barley residue though barley is less severely affected by this disease. Many farms are becoming more and more crop-oriented, so such a break is difficult to achieve. Take-all can also survive on couch (or twitch) rhizomes. Areas with severe couch problems should be avoided for wheat cropping as couch is often infected with take-all. Killing the couch by spraying just before sowing does not solve the problem, the couch must have rotted before the take-all fungus dies; this can take up to a year.

If the area chosen for wheat is ex pasture, then there could be present, grass grubs and other soil insects such as wireworms, which will damage the roots of the young crop. Thus grass grub control treatments may be essential prior to or at drilling, such as a granular insecticide incorporated during cultivation. Early and thorough cultivation of paddocks ex grass is also important to stimulate organic matter break-down, to kill aphids on the grass and destroy foot-rot organisms (from the grass) that may attack wheat.

Time of Sowing

The recommendation to sow at the end of May or early in June for virus control still applies. This ensures that the crop emerges after the cereal aphids have stopped flying, and so autumn infection with cereal yellow dwarf virus is avoided. Because of difficult soil conditions and other reasons some farmers have to sow early in May. In these cases a granular insecticide for aphid control, should be applied at sowing or the crop be sprayed in

mid-August to control aphids and stop the spread of virus. This insecticide spray could be combined with that for weed control.

Volunteer Cereals

These are self-sown cereal plants, which may grow from seed that has shaken from the ears or fallen from the header and then been incorporated into the soil during the cultivation for early autumn-sown pastures or crops. These self-sown plants can be an important source of mildew and leaf rust spores, as well as of aphids - both cereal and grain aphid. It is essential for these to be eliminated as much as possible by hard grazing. Barley volunteers should also be grazed, though the mildew and leaf rust on barley will not attack wheat, and those on wheat will not attack barley.

PROTECTION THROUGHOUT GROWTH STAGES

As a farmer, you have followed all this advice. Good treated seed has been obtained, sown at the correct depth (5 cm), at the right time and in the right amount, and in an area not previously in wheat. Should you now be able to forget about the crop until harvest time? No. With the emphasis now on the use of nitrogen and irrigation for maximum yields, the crop does need to be examined from time to time. The first thing is an emergence count to see that you have the right number of plants per square metre (250 - 300) likely to give the optimum number of ears at harvest.

Early in the season carefully consider weed control, especially if you want to change your weed control programme and use different chemicals. Check on the properties

of the large range of chemicals or combinations now available, try and decide what is best for you, and if necessary purchase stocks in advance. Farmers may need to wait and see what weeds are going to be present, but from past experience most will be aware of their problem weeds. Weeds also increase the humidity within crops, and this can increase the amount of some diseases.

Vigilance against diseases is important. During the period of tillering (growth stages 3 - 5), infections of speckled leaf blotch can occur and cause considerable damage to leaves. When these become infected, they turn yellow, with brown areas present in which are embedded small black spore-producing bodies known as pycnidia. In 1979, research by Dr Sanderson of D.S.I.R. and Dr Gaunt of Lincoln College showed that this disease was controlled satisfactorily by sprays of Benlate, by Bayleton and to some extent by Bravo. For most crops, it is suggested that these chemicals should be applied in late August at the same time as the weed-killer sprays. Care should be taken to ensure that the various chemicals used are compatible (can be mixed together), that the mixture does not damage plants, and that effective control of weeds and disease is still being obtained. In 1979 speckled leaf blotch was severe in early spring (late August - early September) but from past experience it is known that the severity of this early attack varies from one season to another. Thus the decision must be either to use the spray treatments in early spring as an insurance or to treat part of your crop to assess for yourself the damage that may be caused by this pathogen. Until there are good methods of predicting disease outbreaks and losses, then farmers should be cautious in adopting overall spray programmes. They should try to evaluate spray treatments on their own farm; spray half paddock areas and, at

harvest, try and get some idea of the difference in grain yield, grain size, and quality from comparable harvest blocks.

In November, speckled leaf blotch can spread onto the top leaves (by rain splash). If the disease appears on the flag and second leaf then a Bayleton spray could be applied, especially as it also controls mildew and leaf rust.

Powdery mildew is another disease that can be found in wheat during the late spring. How much damage does it do? The conclusion from a large number of trials is that in general it is not worth treating wheat for the control of this disease. However, there could be some crops especially of Aotea, Hilgendorf and Rongotea which would be well worth spraying; but it is always difficult to make this decision. Again leave untreated areas to assess the value of the spray.

In growing wheat, there could be advantages from spraying on a growth regulator. The only material at present available is Cycocel, a product used extensively in Europe. This is suitable for use on wheat and oats, and is best applied during growth stages 6 and 7, the stem elongation phase when the first and second nodes can be felt at the base of the stem. Cycocel helps to limit straw growth and so makes the crop easier to harvest, with uniform crop height and less straw to process through the header. Cycocel also helps to stimulate root development and thickens the stem thus reducing the likelihood of lodging and stem break by strong winds. This is an advantage where high inputs of nitrogen have stimulated growth or a light infection of eyespot is expected. Where heavy infections of eyespot are expected, Benlate sprays will give better control (best applied at G.S. 7 - 8).

A further problem is leaf rust which may attack the wheat crop during the later stages of plant development, from the boot stage (G.S. 9 - 10) onwards. The fungicide Bayleton is excellent for rust control. The problem is knowing whether to spray or not. Obviously the disease must be present before spraying is worth it, so the crop must be inspected. To avoid routine spraying of all crops, some rule-of-thumb is needed in order to determine when to spray. Good research experience is not available with leaf rust of wheat, but some guidance can be obtained from work on leaf rust of barley. A representative and unbiased sample of 30 to 50 or more tillers is obtained from the crop at a time when all the ears have emerged and prior to flowering (growth stage 10.5). The flag and second leaf are examined for leaf rust. If more than half of these leaves are found to be infected (two or more postules), then spraying would be warranted. If this level of infection is not reached till much later (flowering complete and grain milky ripe G.S. 11.1) then spraying is going to be of less value. It is hoped that further research will clarify the recommendations relating to rust control in wheat.

Stem rust is a disease which is not generally a problem. In some years and in some localities it may cause severe losses. Again accurate diagnosis is important, and if it is found infecting all stems at growth stage 10.5, then spray with Bayleton. Similarly grain aphids sometimes can be a problem as they infest the developing ear and feed on the young grain. At one time these aphids caused considerable damage. Isolated outbreaks still can occur; spray if 30 percent of the heads are found to be infested. The wheat bug *Nysius huttoni* is also sporadic in its distribution. Through feeding on the grain in the head, the insect causes damage which subsequently affects baking quality.

The main message is that farmers should inspect their crops *regularly* and get as much advice as possible. If you do decide to spray a crop, then knowing the costs involved, you should try and get some idea of the benefits obtained from each spray. In this way valuable experience will be gained which will be vital in planning future strategies for control of diseases, insects and weeds.