CONTROL OF BARLEY GRASS IN HAWKES BAY

By F. H. COLLIN, Department of Agriculture, Hastings

BARLEY grass (*Hordeum murinum*) is no newcomer to the New Zealand pastoral scene, in fact, in Allan's book "Naturalized Flora of New Zealand" it is stated that Hooker observed it in Otago in 1864. It was then confined to waste places in the district. Since then, however, it seems to have spread to all provinces, irrespective of conditions being favourable to its habitat. As it is a native of Eurasia and North Africa, it is understandable that its spread would be more rapid on the warmer, drier soils. This has proved the case, especially on the east coast of the North Island, where Hawkes Bay is rather looked on now as the home of barley grass.

Farmers in this district are vitally concerned with the spread of this troublesome grassy weed and the damage caused to stock and stock products. Barley grass is usually looked on as an annual, but I think it more correct to term it an annual to biennial. However, whichever is the case there is no denying the fact that it is a prolific seeder, and being unpalatable, in the seed head stage it is neglected by stock, thus allowing it to produce seed at will.

Its barbed seed head possesses remarkable penetrating powers, which allows for forward movement only. This injurious penetration can cause considerable damage to stock and a corresponding loss to farmers each year.

Briefly, just to itemise some of the damage:—

1. Seed is picked up in the wool and penetrates the skin. Pelts are badly scarred and punctured and such blemishes render them unsuitable for first-grade leathers.
2. Penetration will travel through the pelt and into the carcass itself. A number of fat lamb carcasses were rejected at freezing works in Hawkes Bay district last season.
3. Check fattening stock as a result of continual irritation.
4. Result in severe septic wounds.
5. Cause blindness in sheep, cattle, and horses.
6. Seeds penetrating the gums of sheep will cause teeth to drop out.
7. Cause severe irritation in the nostrils of all stock.
8. Sheep dogs working on barley grass country are very susceptible to injury. Seeds become embedded between the toes and work up into the foot or leg muscles.

These reasons alone are sufficient to drive home to all the seriousness of allowing this weed to go unchecked. Not only is barley grass a menace to stock, but the grass itself can reduce the productivity and quality of the pasture sward. It is generally first noticed in a paddock where there is little competition from other species, such as around water troughs, plantations, haystacks, sheep camps, yards, spoil from drains, gateways, etc. Once established it spreads rapidly. Seed can be spread by various means; on the hill country by stock, wind, etc.; and on the flat land, apart from stock and hay, by the pick-up header harvester threshing perennial ryegrass seed areas.

Most of the annual grasses and low producing species can be controlled by good pasture management together with topdressing, but this

is not the case with barley grass. It thrives well on fertile soils, but is found on some of the poorest soils in the district. Stock camps are the main source of infestation. A few plants will be found the first year, and in a matter of a few years will be observed over most paddocks on the farm.

A very disheartening aspect is the fact that the more trouble the farmer takes to raise the fertility of his soil the more firmly does the barley grass establish. There is no doubt that the extent to which barley grass establishes and spreads depends very largely on the openness or density of the sward. Unfortunately, the long dry summers in Hawkes Bay district make the keeping of a tight sward practically impossible. I personally have seen cases of barley grass thriving on irrigated dairy pastures.

The stage has now been reached when any pasture which opens up after summer droughts is liable to infestation of barley grass. To deal next with the most important section of the paper, namely control:—

Until the introduction of new chemicals all known methods of control were practised: mowing, raking and burning, the use of the flame-thrower, scything along fencelines, harrowing and oversowing, and ploughing and resowing. Mowing and scything was found to be unpracticable, as barley grass soon adapted itself to cutting, and promptly produced seeds on short stalks that were too low for the mower. Because of the long seeding season the use of the flamethrower proved uneconomical, so that the only method of control on the flat ploughable country was crop rotation. This is still one of the main methods of keeping barley grass in check today. Though it suits a section of the farming community where the production of ryegrass seed and peas for canning is in the rotation, it does not help the farmer who requires long-term pastures for stock purposes. Because barley grass was still getting the upper hand, investigations into the use of specific weedicides for control began.

The main preliminary trials were carried out in 1952, although prior to this a few small trials were laid using hormone preparations of 2,4,D, and a sodium chlorate 10 per cent. solution at 50 gallons per acre. Hormone preparations had no effect on barley grass, and the sodium chlorate gave a severe burning effect of all pasture species. In the early stages it appeared as though sodium chlorate would give a good measure of control, but it had no lasting effect as far as barley grass was concerned.

The first of the larger trials laid down in 1952 were set out on an area where barley grass was dominant in the sward, and had obviously reseeded over a number of years. The treatments used were TCA at 5 and 10lb. per acre, and IPC at 2 and 4lb. All treatments were applied with a knapsack sprayer with 240 gallons of water per acre. The late autumn and early winter period was extremely dry; in fact, May, June, July was one of the driest periods on record. Stock had little choice, consequently the barley grass was grazed down to approximately an inch in height.

The first application of the treatments was made on 29 July, and heavy rain fell 2 days after application. One week later all treatments gave a burning effect, which was more marked on the heavier treatments. After 3 weeks, the barley grass on the plots with the lighter treatments showed signs of recovery. The heavier applications were quite effective. The white clover and perennial ryegrass on the trial area were not affected by any of the chemicals.

At the end of August, approximately a month after the first trial, a further series was laid down. The treatments used were the same.

Owing to the heavy rain and warm conditions throughout the month the barley grass grew vigorously, and plants were up to 3in. in height. Apart from a slight burning effect after a week a marked recovery was noticeable on all plots.

A third series was laid in early October approximately 5 weeks after the second trial. The barley grass was then 5 to 6in. in height. The treatments used were the same, and at no time was there any effect on the barley grass. At the same time as this application it was observed that the heavy rates of TCA and IPC on the first trial, that is applied in July, had given a good control of barley grass, but seedlings were appearing over the plots. Reversed treatments were then made. For example, the 5lb. plot of TCA received 10lb. and the 10lb. plot received 5lb., likewise with the IPC. These treatments gave good control of seedling plants.

Inspection in November of the whole trial area showed that the August treatments on vigorously growing barley grass approximately 3in. in height gave a temporary setback only. Early October applications on barley grass up to 5in. gave no control.

In December the plots with the repeat applications were showing signs of further seedling growth. After a wet summer and autumn barley grass continued to grow strongly. However, in April, 1953, two further trials were laid down using TCA and IPC, but owing to the rank growth of barley grass neither treatment was effective.

The conclusions from these trials indicated that:—

1. Barley grass seedlings could be controlled.
2. That applications of these treatments must be made before the strong spring growth commences.
3. Applications must be made to short growth, so that treatments reach the ground surface.
4. That it was uneconomical to apply treatments to an area where barley grass had reseeded over a number of years (repeat applications would be necessary until the barley grass seed in the soil was exhausted).

With the information gained from these experiments it was obvious that further trials would be necessary before any recommendations could be made. With the advent of new chemicals on the market further trials were conducted in 1954.

The area in question was hard grazed prior to application of treatments and barley grass was down to approximately 2in., although there were patches up to 3 to 4in. No plot contained less than 45 per cent. of barley grass. The trial was laid down on 25 May. The treatments applied were:—

IPC (wetable powder) 2 and 4lb. per acre.

TCA 10 and 20lb. per acre.

CIPC 4 and 8lb. per acre.

Endothal 4 and 8lb. per acre.

CMU 2 and 4lb. per acre.

With the exception of the IPC all treatments were applied with a knapsack sprayer, and 160 gallons of water to the acre. The IPC was applied in powder form, and mixed with sand to obtain an even spread.

Three weeks later the plots showing the most promise from the control angle were oversown with a mixture of perennial ryegrass, cocksfoot, white clover, subterranean clover, crested dogtail, and short-rotation ryegrass.

On inspection in early August just about 2½ months after laying down both the TCA plots showed a practically 100 per cent. kill, although the clovers and some perennial ryegrass plants on the 20lb. plot which showed a burning effect in the early stages were starting to recover. CIPC areas gave quite good control, and both the CMU plots at 2 and 4lb. were completely bare.

On the remaining plots there was practically no effect. Since laying down just over 6in. of rain was recorded. The oversowing was very disappointing, only a fair strike being obtained. This was probably due to the lateness of sowing more than to the effect of some of the treatments on germination. Those plants that did strike on the CMU plots died off a little later.

By February, 1955, following a dry summer, only 5 per cent. of barley grass was showing on the TCA areas. The CMU plots still showed a big percentage of bare ground. Most of the other plots contained more barley grass than they had originally.

On inspection in May, 12 months following the laying down of the trial, some barley grass seedlings were appearing on the TCA plots.

Following on from this trial further experiments are being conducted this year. Although the treatments are confined to TCA, much less water is being used. It is obvious from the farmer's point of view that the application of over 100 gallons of water per acre is not very practicable.

Plots were laid down at the end of March on barley grass seedlings which had germinated after the first autumn rains. The 15lb. plot of TCA gave good control, but it is apparent from the small patches of bare ground that perennial ryegrass seedlings had also been killed out.

The 10lb. application gave equally as good a control and did not affect the young ryegrass plants. After heavy rain in April warm conditions followed and all plots in May were showing further barley grass seedlings.

To summarise the results that have so far been obtained in the district from experimental work, I would say:—

1. That seedling barley grass plants can be destroyed by chemical means.
2. That TCA at 15lb. per acre in 80 gallons of water is the most effective treatment.

I would like to deviate here to mention that it is my belief that soil types also have a bearing on the amount of chemical required for successful spraying. Though 10lb. per acre gave good results on a heavy clay loam soil, the lighter well-drained soils could require up to 20lb. per acre to obtain the same results. The drawback to this is that applications over 15lb. per acre tend to have a decided retarding action on the growth of other grasses and clovers.

3. The best control has been obtained from late autumn applications.
4. Hard grazing with sheep prior to application. It appears necessary to allow the spray to contact the soil surface.

As in all farming activities the question of cost must be considered.

No single treatment will kill both the existing plants and seed lying dormant in the soil. Repeated applications would be necessary to control germinated seedlings. This would be costly.

On flat ploughable land where barley grass has reseeded over a number of years and spread thickly throughout the pasture sward ploughing, cropping, and resowing to pasture would give better results.

If barley grass appears the following season, the area can be treated by chemical means.

On the hill country paddocks where barley grass has appeared on sheep camps these areas will be the most difficult to deal with. Apart from the use of chemicals with repeated sprayings, pasture improvement and grazing management must be an essential feature in the control. Mob stocking or rotational or systematic grazing, whereby all the herbage is grazed fairly evenly, is a positive way of improving most pastures and can play an important role in checking this troublesome weed. All these methods of grazing help to eliminate permanent sheep camps.

It must be remembered that the killing of barley grass is an expensive job, whichever way it is tackled.

It is to be hoped that farmers in other districts who have only small patches of barley grass showing up on their properties will do their utmost to rid themselves of this weed before it takes charge as it has done on areas in Hawke's Bay.

DISCUSSION

Q.—Have dry applications of TCA been compared with sprays of TCA?

A.—TCA has been applied dry with superphosphate, but no results have been obtained as yet.

Q.—Is barley grass palatable in the young stages?

A.—Under mob stocking conditions in spring stock will eat it. But when the barley grass reaches the stage of rank growth, stock cease grazing it in preference to the more palatable grass species.

Comment: In Australia if lambs and hoggets are introduced early to an area of barley grass, they will find it palatable and are then accustomed to feeding on it.

Q.—Is more than 15lb. per acre of TCA of value in controlling barley grass?

A.—TCA at higher rates affects other grasses too severely, though they recover later.

Comment: Optimum amount is between 10 and 20lb. TCA per acre. More than 20lb. per acre results in severe suppression of cocksfoot, ryegrass, and clover and hence later there is an increased weed re-infestation. CIPC at a rate of 8lb. per acre is recommended for nucleus areas.

Q.—What value is there in the oversowing of barley grass infested areas?

A.—Badly infested flat areas should be ploughed and resown. Deep plough in spring, then crop with, say, peas, then shallow plough, and later sow an autumn pasture.

A difficult problem is control along the fencelines. Either refence after ploughing or repeat spray along the fenceline.

Q.—Has any difference between IPC and CIPC been found in the control of barley grass?

A.—IPC applied as a wettable powder in sand had no effect. CIPC, though giving a satisfactory initial kill, has no residual effect after 12 months. It must be borne in mind that the soil type is very important and also results vary greatly, depending on the soil moisture conditions and weather following application.