ECOLOGY OF BARLEY GRASS

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BARLEY grass (*Hordeum murinum*) is an exotic annual which has been naturalised in New Zealand for many years. It is a native of Eurasia and North Africa, from whence it has spread to most temperate and semi-tropical countries and unfortunately to most parts of New Zealand also.

Another species, seaside barley grass (*Hordeum marinum*), is common on some saline flats and coastal country and often forms an almost pure sward, especially in the South Island. It rarely, if ever, occurs inland, but in its habitat it is just as pernicious as the ordinary and more widely spread barley grass.

Breakwell (1) when writing of barley grass in 1923 considered it had been in New South Wales for over 40 years. As it probably reached that country in grain seed, its introduction to New Zealand may have coincided with the beginning of cereal growing by our early settlers.

For many years barley grass was regarded as just a worthless annual that occupied waste places. Now it is probably one of the most insidious and objectionable weeds of pasture and to the unwary farmer it may be like a wolf in sheep's clothing. As barley grass seeds have long barbed awns, they can cause a multitude of troubles to pastoralists and to sheep farmers in particular. Cases have been reported of barley grass seeds getting between the teeth of sheep and causing trouble. Woolly lambs and sheep get the seeds into the wool around their eyes, and seeds have caused injury or irritation to the eyes. Seeds that have broken off the stalks and lie in the pasture have been known to get into the nostrils of sheep and cattle and cause severe irritation. It has been reported that seeds have penetrated the jaws and caused suppuration, resulting in loss of condition or death of the affected animal. Some farmers have said that their dogs' feet have been injured by barley grass seeds.

The foregoing objectionable features are mentioned in overseas literature and confirm experiences in New Zealand.

Overseas buyers of New Zealand pelts have, from time to time, complained about or commented on the number of pelts that are damaged by seeds and it seems that the east coast of the North Island is notorious in this regard.

One New Zealand firm reported that 40,000 pelts at its works were damaged by seed penetration and this represented nearly 7 per cent. of their total for the season reviewed.

Pelts are graded before being sold and the punctured and damaged ones fetch a very much lower price than undamaged ones.

The export of pelts is of considerable importance to New Zealand's economy, as may be realised from the fact that in 1950 16,790,703 pelts worth £6,155,859 were exported. Of these 13,077,096 went to America and earned dollars to the value of £4,560,922. Unfortunately I cannot quote figures more recent than 1950, but as the number of pelts exported has been rising slowly each year, it is obvious that the industry must not be jeopardised through having a high percentage of seed-damaged pelts.

For the various reasons just given, barley grass must be ranked as an objectionable pasture weed, especially as it is spreading fairly rapidly in some districts and slowly, but very surely, in others.

Like most annual plants it is a prolific seeder and, being unpalatable, it is neglected by stock, thereby enabling it to produce seed unhindered and spread further afield.

Not only is barley grass a menace to sheep, but the grass itself threatens to reduce the productivity and quality of the pastures it invades.

By topdressing, combined with good pasture management, most of the low-producing and annual grasses can be controlled and prevented from spreading. This is not so with barley grass. It grows best on fertile soils, but is by no means restricted to them.

As stated previously, it is an unpalatable grass and apparently is not eaten by stock at any season unless they have no choice. This may be due to the roughness and hairiness of the leaves, or to some other factor affecting palatability of grasses and about which we have little knowledge.

During the last 20 years barley grass has been seen to spread from a few isolated plants on stock camps until it has become widely spread over most paddocks on the farm. Rich soils and poor ones have suffered alike in this respect.

There can be little doubt that the opening of the sward on stock camps is one of the prime factors favouring the initial establishment of barley grass, as invariably it appears first under shade trees and shelter belts and near buildings, stock yards, races, and haystacks. The surface soil in such places is usually highly fertile. Raising the fertility of the soil will not, by itself, hinder the growth or restrict the spread of barley grass. Local distribution of seed may be by wind alone, whereas over longer distances it probably occurs through seed adhering to stock or being transported in hay.

The extent to which barley grass establishes and spreads when it is introduced to a farm or district depends very largely on the openness or density of the sward.

Poaching or pugging of the surface in wet seasons, close grazing in dry periods, and the taking of hay or seed crops create conditions that enable barley grass to establish freely and readily.

Factors conducive to the establishment of barley grass on stock camps and under shade trees are (a) opening of the sward by intensive tramping; (b) smothering of perennial species by accumulation of dung; (c) toxicity of excessive quantities of urine and dung on existing pasture; (d) fouled pasture is not readily grazed, thereby allowing barley grass full scope to grow and produce an abundance of seed; (e) the accumulation of animal manures raises the fertility of the soil to a level which is too high for many pasture plants such as danthonia and browntop, which gradually weaken and are then replaced by either high-fertility demanding perennial species or by annuals such as barley grass. Alternatively the ground remains bare except for the accumulation of animal manure. From observations over many years it is quite apparent that this objectionable weed can thrive in a wide range of conditions. It grows well in soils that are either wet or dry, hot or cold, rich or poor, acid or non-acid, in shade or in sunshine; in fact it will grow in almost any place where some other grass or grasses can grow.

In view of these circumstances it will be realised that there are few, if any, natural barriers to the intrusion of barley grass, and the possibility of its spread becoming accelerated in any weak, open pasture must not be disregarded. Barley grass has already invaded and is still spreading in some of the high-producing ryegrass and white clover dominant pastures.

Likewise it is invading hill-country pastures, especially those in dry districts which contain a fair amount of hairgrass, English hairgrass, and annual clovers. The same open sward conditions that enable those species to re-establish each year are ideal for barley grass also.

During the process of improving such pastures numerous farmers have witnessed the encroachment of this aggressive weed on their properties.

Through the introduction of subterranean clover combined with phosphate topdressing extensive areas of hill country have been vastly improved, more stock have been carried, stock camps have increased in size and number, and during unfavourable seasonal conditions, through bad management and overstocking, pastures have been seriously damaged and opened up with the results that weeds, including barley grass, can establish readily.

Another factor that must be considered is the effect that subterranean clover has on the pasture. A dense, luxuriant growth of it tends, by its smothering effect, to weaken some of the poor types of grasses during its period of rapid growth. In due course, when the subterranean clover sets seed and dies out, it leaves patches of bare ground, as do all annuals, and to this fact the establishment of barley grass can be attributed in several instances.

Topdressing and the encouragement of more prolific growth of clover are essential phases in pasture improvement, and if there is a fair proportion of annual plants present, precautions should be taken to prevent invasion by barley grass.

To this end endeavours should be made to prevent it from seeding in places where it is already established. This is not easy to do, because, first, stock are reluctant to graze barley grass, and second, even if mowing is practicable the grass readily adapts itself to cutting and promptly produces seeds on short stalks, stalks that are too short to mow; and furthermore there are always those odd corners where mowing and even scything are hardly practicable.

Some preliminary trials with a flamethrower proved that not much heat is required to collapse the cells in the seed stalks, thereby causing them to wilt before any seeds had formed. Obviously not much heat is required at any one time, but on account of the long duration of the seeding season it would be necessary to use the flamethrower two or three times at least during the season.

Out on open paddocks and on hill country in particular the use of a flamethrower is not really practicable. Under such circumstances it seems that the barley grass will have to be tolerated until the pasture is so improved in density with perennial grasses and clovers that there is just no room for it to re-establish. Fortunately, it is an annual or a biennial at the most, and not a perennial.

Pasture improvement, therefore, is an essential feature in controlling barley grass, but whereas cultivation and cropping followed by the establishment of new permanent pasture may be effective on easy country, other processes must be adopted on unploughable land. Rotational grazing or mob-stocking whereby all herbage, palatable or unpalatable, is fairly closely grazed periodically is a positive way of improving most pastures and it could play a major role in checking barley grass.

Set-stocking on the other hand usually results in a diminution of the palatable perennial species and consequently an increase in undesirable ones.

Farmers who have small infestations of this weed on their properties should not delay in taking action to eradicate them.

Recent experiments by officers of the Department of Agriculture show that barley grass can be controlled with specific weedicides, but how this treatment compares in efficacy and economy with the flamethrower has not been investigated. It is probable that though the weedicide method may be the better one for dealing with seedlings or young barley grass, the flamethrower may be better when seed stalks appear.

Paddock-scale treatment of pasture infested with barley grass is another matter, and whichever way the job is tackled it will be expensive. No single treatment is likely to kill both the existing plants as well as all the seeds which are lying dormant in the soil. Repeat treatments will be needed until the seed supply is exhausted.

In conclusion it must be stressed that the mere killing of barley grass or any other weeds is of little avail unless concurrently with their destruction some useful plants replace them. This applies to all weeds and resolves itself, therefore, into a matter of eradicating them by the most effective means known and then adopting the best technique of pasture establishment and maintenance.

(i) Grasses & Fodder Plants of New South Wales, E. Breakwell, 1923.

DISCUSSION

Q. I once experienced a case where 70 per cent. of lambs in a draft had pelts rejected through damage by spear grass (*Stipa* spp.) seed. Is this any relation to barley grass?

A. (Madden): Spear grass is quite a different plant. It covers a far smaller area in New Zealand than barley grass and is of much less importance.

Q. A farmer friend has a large amount of barley grass in good pasture on irrigated land in Canterbury and cannot get rid of it by irrigation, topdressing, or grazing management. What treatment is recommended?

A. (Matthews): In recent Department of Agriculture trials good control has been obtained with 4lb. of wettable powder of Chloro IPC when barley grass is in the seedling stage.

Q. When does barley grass germinate? For controlling with IPC and TCA these chemicals must be applied in the early seedling stage of growth.

A. (Madden): It comes away mainly in autumn, but I have seen seedling plants in spring. Unfortunately not many people can identify it in the early stages, so it is difficult to get on to new areas in paddocks and spot treat them. As it makes rapid growth and not all seed germinates at the same time, it may be necessary to treat it several times per season with the chemicals named.

Comment: It may be a good idea to mark out barley grass areas in summer and treat them next autumn and spring; that is, mark them when most recognisable and treat when most susceptible.

Comment: There are hundreds of thousands of acres of barley grass in Australia, where it is readily eaten by sheep. We have evolved a system of shearing early to avoid the seed heads of barley grass and spear grass. Barley grass is one of the most widespread grasses in Australia and is just accepted.

A. (Madden): Barley grass can be dealt with in some conditions. I suggest farmers treat small areas whenever they occur and thus prevent spread. On hill country the use of TCA or any other chemical is probably not feasible, and the best advice I can give is to clean up small nucleus areas of infestation before the plant gets out of hand.