WHAT IS A "GRASS WEED"?

G. S. HARRIS

*Grasslands Division, Department of Scientific and Industrial
Research, Palmerston North*

Summary

The reasons for regarding certain grass species as weeds are outlined from the viewpoint of their effects on pasture production, and the lack of present factual data to enable a valid estimation of the value or otherwise of weed grasses is stressed. Two matters appear to be of prime importance at this stage — the compiling of a list of grasses which may be fairly regarded as weeds for various reasons, and the arranging of such a list in order of importance. This is considered essential in order to ensure maximum effectiveness of any control measures which may be undertaken.

AN Australian author has made the following comment on the relationship of pastures to animal productivity (Ailken, 1968): "Plants are the substrate on which our grazing animals subsist and it is the quantitative relationship between plant production and animal numbers that largely influences turnoff of animal product. It is only through an understanding of what influences pasture productivity in grazing ecosystems, of what determines how much pasture an animal will eat, and of how that pasture is converted to animal product that we can make realistic assessments of pastoral situations in terms of potential productivity."

If these criteria are accepted, then any plant which is of lower palatability will reduce intake, and this applies to many "weed" grasses; any plant which contains less digestible nutrients is of lower conversion value, and on the scanty information available in the literature this applies also, generally, to "weed" grasses. From this it follows that "weeds" will usually result in lower productivity from the pasture association.

Most bred pasture species are developed with three main objectives in mind — the maximum production of nutritive herbage, the maximum spread of seasonal production, and compatibility in pasture mixtures (Corkill, 1969). Pasture sowings are made with these features in mind, and what is desired is a sward composed of the sown species. Anything else which is not equal or better with respect to the three criteria mentioned earlier is unwanted, and reduces the value of the sown species. Such plants can therefore be regarded as weeds.

Nevertheless, caution is necessary in making sweeping definitions of grass weeds, as certain grasses which in New Zealand are normally regarded as weeds may be useful plants in particular circumstances. For example, bromus mollis (*Bromus mollis*), a common and objectionable weed in ryegrass (*Lolium* spp.) seed-crop areas, has at least one recognized cultivar overseas for use in very low rainfall areas as quick-maturing spring feed. Again, mixtures of weed grasses, usually cleaned from seed crops of pasture species, may be used in areas subject to active soil erosion to provide a quick protective cover. The definition of a grass weed, therefore, depends on context.

For some of our bred pasture species, high fertility is essential for good production of herbage, and lack of fertility results in less vigorous growth, openness of the sward, and ingress of species which can better tolerate lower fertility conditions. Again, some country, particularly hill country, is of naturally lower fertility which it is not economic to raise to, say, ryegrass standard. Here the lower fertility species are prevalent or dominant, and such grasses as vulpia hair grass (*Vulpia* spp.) and others usually regarded as weeds may be serving a valuable purpose in providing a bite for stock, albeit in reduced numbers, or in providing a plant cover to reduce erosion. Should we still regard these as "weeds"?

There are, of course, other grasses which because of one or more particularly objectionable features are classed as weeds no matter where they occur. Such are exemplified by nassella tussock (*Nassella trichotoma*), which by its aggressiveness and very low palatability may completely suppress all other species; by grasses which have awns which mechanically injure stock or depreciate value of fleece and hides, as is the case with barley grass (*Hordeum murinum*); by grasses which because of seeding habit contaminate seed crops of pasture grasses; and by grass weeds of known or reputed poisonous nature which depreciate the value of sown pastures.

While in such cases the issue of "weed" or not is clear-cut there are obviously many others where the position is much more obscure, and definition will depend on one or more of many factors. All this must be kept in mind in defining a grass weed, even the fact that while in one situation it may be a true weed, in another it may not be. For example, included in a list of "Weeds and their control" in a New Zealand publication are cocksfoot (*Dactylis glomerata*), paspalum (*Paspalum dilatatum*), prairie grass (*Bromus unioloides*), timothy (*Phleum pratense*), and ryegrass, along with barley grass, summer grass (*Digitaria sanguinalis*), pennisetum macrourum (*Pennisetum macrourum*), ratstail (*Sporobolus africanus*) and couch (*Agropyron repens*). Where do we draw the line?

It is surprising how little factual information on grasses which are commonly regarded as weeds is on record, though such information may possibly exist unpublished. Particularly is it difficult to find information on chemical composition and nutritive values, especially with reference to New Zealand conditions. Statements of opinions, such as "this grass is of low feeding value", are common, but unsupported with figures; several authors make definite statements of fact (in the writer's opinion) with no evidence other than opinion in support.

The following items in particular appear in need of closer investigation and factual information to allow a valid assessment of the problem:

- (1) How common are grass weeds of pasture? Do they occur throughout the country, or are some confined to small and local areas? Information on this is basic to a policy of eradication or of control.
- (2) How much damage do they cause? What is required here is an assessment, supported by figures, which will allow an appraisal of relative importance.
- (3) How difficult are they to control? On the ease of control, and the means employed, depends cost of control; and on this the feasibility of a concerted programme.
- (4) What particular conditions favour the growth and spread of grass weeds? While certain points governing establishment and spread are

fairly clear, there is much in this field which needs further information.

- (5) What is the value to the grazing animal of the weed species of grasses? As mentioned, few figures on this are available, certainly not enough to condemn or commend a species even in a general way.
- (6) Should we be keeping a more stringent watch on other overseas grasses, not yet a problem here, but potentialities for the future?

The list could be extended even further, but sufficient has been mentioned to stress the lack of detailed information available for most of the grasses at present placed in the weed category. As such factual data become known, the importance of deciding which grasses are our worst pasture weeds also becomes more pressing, since it will obviously be impossible to deal with each and every one at the same time. This order of importance will obviously depend to some extent on which features of our weed grasses are considered those justifying more urgent action, and some of these could well be, not necessarily in order of importance:

(a) *Grasses which cause mechanical injury to stock.*

This is usually due to the presence of awned seeds which penetrate the flesh, causing damage which may restrict the animal's food intake, or may damage pelts and even reduce the value of the carcass. Species of *Stipa*, *Bromus* and *Hordeum* are probably the most important of this group.

(b) *Grasses regarded as weeds because of lack of palatability.*

Lack of palatability, almost invariably estimated by visual comparison with other species in a mixed sward under grazing, may be due to many factors, among which are harshness of leaf, a high fibre content, presence of essential oils or other constituents, or to hairiness of leaf. Grasses in this group are, for example, sweet vernal, nassella tussock, *Eragrostis* spp. and ratstail.

(c) *Plants, or seeds, having a poisonous constituent.*

This effect may be due to an inherent poison in the plant, such as the postulated substance in tall fescue causing "fescue foot", to the presence of a fungus in the plant producing toxins, or in the seed as is the case with ergot. Under some growth conditions, the prussic acid content of certain grasses such as *Sorghum* spp. may rise to dangerous levels.

(d) *Seeds of grasses regarded as undesirable weeds in crop seeds.*

The best known example is perhaps seed of *bromus mollis* in rye-grass crops, although in Chewings fescue (*Festuca rubra* ssp. *commutata*) seed ryegrass itself is an undesirable impurity, as is the seed of *Vulpia* spp. The classic crop example is wild oat (*Avena fatua* and *A. persica*) in cereal seed crops.

(e) *Grasses regarded as weeds because of poor herbage production.*

The grasses in question are usually annual ones, which by their nature concentrate on survival by the production of a profuse seed crop at the expense of vegetative growth, for example *Vulpia*, *Aira*, and annual

Bromus species, but the same may also apply to some biennial or perennial species.

Blue wheat grass (*Agropyron scabrum*), which is regarded as palatable and reputedly nutritious, in many of its forms, does not make great vegetative growth and is often crowded out by more aggressive species.

The question of the reason or reasons for poor vegetative growth could validly be raised in many cases — is it a matter of naturally poor vegetative production, or do suppression by competition and fertility factors play a part?

(f) *Annual species which on death leave an open sward.*

This group consists mainly of *Vulpia*, *Aira*, *Lagurus*, annual *Bromus* species and *Poa annua* (*Poa annua*). The fact that their disappearance leaves an open sward is not important so much from the reduced herbage production per unit area as from the fact that the openness leaves a pasture prone to invasion by worse weeds than the annual grasses they replace.

(g) A miscellaneous group, not normally regarded as serious pasture weeds except in local areas, but which may become important during the phase of pasture renewal. Cultivation may divide these grasses but in many cases only serves to multiply them, and the resulting plants compete with seedlings of the sown species and reduce the value of the pasture by reducing production or lowering palatability.

Depending on local circumstances, examples could well be couch, Indian doab (*Cynodon dactylon*), Kikuyu grass (*Pennisetum clandestinum*), or creeping fog (*Holcus mollis*).

(h) Those grasses which, under most New Zealand conditions, are more of a nuisance value than bad weeds. In many places summer grass, *Echinochloa* spp. and crowfoot grass (*Eleusine indica*) could be included here.

(i) Particularly aggressive grasses, usually adapted to particular situations or conditions, and as yet of local distribution but potentially capable of colonizing wide areas. Manchurian wild rice (*Zizania latifolia*) and nassella tussock are good examples.

That the grouping given, and examples quoted, can be interpreted in various ways by various people is fully realized, and illustrates the necessity for a concerted effort in establishing an "order of importance" for weed grasses. A green keeper anywhere in New Zealand would probably name *Poa annua* as his worst grass weed, a parks and reserves superintendent in the warmer northern areas might equally justifiably name *Paspalum*, where a farmer in the same district might select Kikuyu grass.

It is essential that the necessity for a broad perspective is appreciated, and that grass weeds be regarded in their broad, and not local, aspect in assembling any list of order of importance.

REFERENCES

- Allden, W. G., 1968: *Proc. Aust. Grassld Conf.*, 2: 213-22.
Corkill, L., 1969: *N.Z. agric. Sci.*, 4 (3): 7-8.