WEED CONTROL IN LAWNS AND PLAYING GREENS

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IN the provision of lawns and playing greens the objective should be to establish a uniform sward of desirable species to the total exclusion, or as near as possible, of all other species which would detract from that uniformity or reduce the playing efficiency of the area. I propose to restrict my observations to the finer type swards, as are represented by the average good household lawn, a well kept public park, or efficient playing surfaces suitable for such sports as tennis, croquet, bowls, and golf. For any and all of these a sward consisting of browntop and chewings fescue as the dominant species should be the objective. Under some circumstances the inclusion of white clover for household lawns or parks might be desirable, particularly where there is a tendency for grass species to become parched during long dry spells. Again such species as crested dogstail might be added to similar swards, and I have even seen *paspalum* used in northern districts quite successfully not only for household lawns, but also for tennis courts, where it provides an exceptionally good sward for baselines. For most sports areas, however, where speed, uniformity of turf, and resilience are all necessary there is really no place in the sward for species other than fine grasses like browntop and chewings fescue. On such areas the intrusion of clover reduces the speed of the green and provides an unstable surface, while grasses like *paspalum*, ryegrass, and dogstail affect the uniformity of the turf to such an extent that skill becomes subservient to luck in the playing of games.

Uniformity in the sward, then, is what should be aimed at, and its ultimate achievement provides enhanced appearance as well as greater efficiency for playing, whether this take the form of children's games on the household lawn or a strenuous game of tennis on club courts.

METHODS OF IMPROVING AND MAINTAINING SWARDS

If we were to make a survey of lawns and playing fields here or in any other part of the Dominion we would find that few reached a very high standard. Most would present a very heterogeneous mixture with flat weeds, clover, bare ground, unsuitable grasses, and moss competing very successfully with the more desirable species. This condition might have been reached through the sowing of a very poor seeds mixture—probably a cheap one—in the first place. So called lawn mixtures may contain a little browntop and chewings fescue of somewhat doubtful age, and the rest might be anything from ryegrass and goosegrass to shed sweepings.

Where the initial sowing has been done with good seed subsequent management—or rather mis-management—often does much to bring about sward deterioration. Lack of fertiliser, unsuitable manuring, unsatisfactory weed spraying, and lack of regular cutting, can all play a part in hastening deterioration.

Assuming, however, that a lawn has been well sown down I would say that the greatest single factor in maintaining it in good order is that of sufficient and efficient manuring. To provide this it has to be appreciated that the main turf species—browntop and chewings fescue—are tolerant of fairly acid soil conditions, while clovers and most weeds require more alkaline soils for their best development. If we appreciate this point and then proceed to make conditions too acid for weeds and clovers, we have done much towards producing a uniform turf devoid of undesirable species. Fortunately this is quite easy to achieve without

having to take other drastic measures if we simply apply adequate sulphate of ammonia with phosphates to bring the pH status to about 5.0. In practice it has been found that a mixture of 3 parts sulphate of ammonia to 1 part superphosphate, applied in three equal dressings of 3cwt. per acre, will provide vigorous growth of grasses and suppression of clovers and weeds on playing greens. For household lawns and parks, where some clover is desired, the ratio could be reduced to 2:1 with two dressings annually at the same rate per dressing.

As I believe that vigour in the sward produced by the above manurial programme will provide an excellent weed free cover, I consider little else is necessary on most good lawns. I cannot stress too strongly, however, the necessity of getting such vigour into the sward by suitable manuring with the above mixture. Other manures such as nitrate of soda, compost, blood and bone, etc., will build vigour but they do not create acidity. Consequently, where they are used, clover and flat weeds will flourish and will ultimately reduce the quality of the sward.

So much for the sward that has been sown down well, but what of the other, sown either with a poor mixture or allowed to deteriorate through faulty treatment? Such a sward will appear to be run-out, unthrifty, and possibly dominated with flat weeds and clovers. Obviously such a sward requires more treatment than manuring. Foreign plants must be eliminated, the spaces that they vacate must be filled by more desirable species, and the original lawn grasses that have survived must be stimulated to the point where a good sward will be established. Quite recently I have carried out programmes of work on a deteriorated lawn and on a bowling green to demonstrate procedure in renovation; but before dealing with these I would like to briefly outline the results of research work on weedy lawns carried out at Hokowhitu Research Area over the past year.

WEED CONTROL RESEARCH WORK

In March 1954 an area at Hokowhitu consisting of a deteriorated browntop-chewings fescue sward, heavily invaded by flat weeds such as plantain, catsear, dandelion, and hawkweed, and other weeds like moss, yarrow, and Onehunga weed, was selected for trial treatments with various weedicides.

Those under trial were as follows:—

Butyl ester	MCP
Butoxy ethanol ester	4-C
Butoxy ethanol ester	2,4-D
Butoxy ethanol ester	2,4,5-T
Alkyl cyclo hexyl ester	2,4-D plus 2,4,5-T
Alkyl cyclo hexyl ester	2,4-D
Butoxy ethanol ester	2,4-D plus petrol
Butoxy ethanol ester	2,4-D plus TCA

The programme of work consisted of applying annual treatments to different blocks in March, April, and September, and treatments to another block in March and September. Across all these treatments different fertiliser dressings were applied to determine what effects they would have in conjunction with the weedicide treatments. Dressings applied in March, April, and September of 1954 are being repeated in the same months this year.

At the end of one year the position was substantially as follows:—

Butyl ester MCP: Flat weeds had been practically eliminated. Grasses and clovers were growing well.

Butoxy ethanol ester 4-C: Flat weeds much reduced, but the treatment fell short in results of MCP.

Butoxy ethanol ester 2,4-D: Flat weeds eliminated, clover somewhat reduced, and grass temporarily checked but recovered.

Butoxy ethanol ester 2,4,5-T: At 1lb. acid equivalent per acre it was not effective; at 2lb. there was good clover suppression (white and suckling) and fairly good flat weed control with grasses unaffected, at 4lb. the effects on clovers and flat weeds were more pronounced and grasses were slightly affected; at 8lb. there was total elimination of clovers and flat weeds with grass definitely checked but not killed.

Alkyl cyclo hexyl ester 2,4-D plus 2,4,5-T: Applied at 1lb. of each there has been good flat weed control, fairly good clover control, and grasses are vigorous.

Alkyl cyclo hexyl ester 2,4-D: The flat weeds have been eliminated, clovers were reduced, and grasses were unaffected.

Butoxy ethanol ester 2,4-D plus petrol: Flat weeds have been eliminated, clover much reduced, and grasses checked.

Butoxy ethanol ester 2,4-D plus TCA: TCA was included at 10lb., 20lb., and 40lb. per acre. In every case there was an almost total elimination of all vegetation.

In addition to the above treatments all of which were made at 2lb. acid equivalent per acre, except where otherwise stated, further treatments consisting of combinations of MCP and 2,4-D with 2,4,5-T have been tried out. Generally, these have given excellent control of both flat weeds and clovers. The use of MCP, because of its efficiency on flat weeds and less effect on grasses than 2,4-D, with 2,4,5-T for clover control seems to be the best combination, using 1lb. acid equivalent of the former with 2½lb. acid equivalent of the latter.

A trial with CMU produced results comparable with those for TCA.

APPLICATION OF RESEARCH

1. RENOVATION OF A WEEDY LAWN

Working on the knowledge obtained from these trials I undertook the renovation of an old weedy lawn during the past autumn. This area had been sown down about 20 years previously with browntop and chewings fescue but had received little subsequent attention. When work commenced it was dominantly flat weeds with sparse and unthrifty grass and clover.

As this was to remain a household lawn, it was decided to bring it back into a browntop-chewings fescue-clover sward. To achieve this I had the area sprayed with MCP at 2lb. acid equivalent per acre in March. After a fortnight the flat weeds—plantain, catsear, hawkweed, self-heal, and some dandelion—were badly affected and well on the way to total destruction. By mid-April the whole area was marked by numerous bare patches which had to be filled. The next procedure was to apply 3:1 mixture of sulphate of ammonia and superphosphate at the rate of 4cwt. per acre and subsequently the worst portions were grooved with sharp rakes and oversown with a chewings fescue-browntop (2:1) mixture at ½oz. per square yard. At present (end of May) the whole area has been transformed. Seed has germinated, grasses and clovers have been invigorated by the manuring, weeds have disappeared, and few bare spaces can now be seen. Unquestionably, the combination of weed destruction, reseeding, and manuring has achieved the goal that was aimed at. Might I hasten to add, however, that any one or even two of these could not have effected this change in the time. Weed destruction alone would have left bare spaces for fresh seeds to establish; seeding alone with grass would have failed through the smothering effect of weeds; and manuring alone would simply stimulate weeds as well as grasses.

2. RENOVATION OF A BOWLING GREEN

With the application of the same principles, a bowling green was taken over in the autumn. On this area clovers, Indian doub, and flat

weeds were dominant with little browntop or chewings fescue in evidence. As both Indian doud and clovers presented major problems I arranged for these to be sprayed as follows:—

- (a) The Indian doud areas with Dalapon at 25lb. per acre.
- (b) The clovers and flat weeds with 2,4,5-T at 3lb. acid equivalent per acre.

This was done in early March with excellent results in both cases. Subsequently the area was grooved, resown, and soiled in early April. At present it is well covered with browntop and chewings fescue and Indian doud and clover have been practically eliminated. Owing to the alkalinity of the area there has been a fairly heavy establishment of *Poa annua* which it is proposed to reduce by increasing the applications of both sulphate of ammonia and sulphur during the winter and early spring.

EFFECTS OF WEEDICIDES ON GRASSES AT VARIOUS AGES

The question often arises as to when it is safe to apply hormone weedicides. To some extent this is being answered by special trials now being carried out at Milson Experimental Area.

In one of these bare cultivated ground was sprayed with MCP 2,4-D and 2,4,5-T at 3lb. acid equivalent per acre. Grass seed was then sown on these areas at the following times: Immediately after spraying, 1 week after spraying, 2 weeks after spraying, 4 weeks after spraying, and 8 weeks after spraying.

Compared with Control which germinated well from each sowing, all treated areas gave poor germination from the first sowing. The sowings 1 week and 2 weeks later were weak at first but strengthened, and those made 4 and 8 weeks after have been very good. It is worthy of note here that MCP and 2,4-D strips have remained very free of weeds, Control has been overgrown with weeds, and the 2,4,5-T strip has been inferior in this respect to MCP and 2,4-D. From this investigation it would appear that reseeding could be done quite safely 3 weeks to a month after spraying.

The second trial concerned spraying recently established turf. Sprayed 1 month after 2,4-D and 2,4-D plus 2,4,5-T have given the sward a severe check from which it recovered after 3 months. MCP has had a slight checking effect, and 2,4,5-T has not affected the grasses very much. All were applied at 1lb. acid equivalent per acre.

The same dressings applied at 6 weeks from sowing have had slighter checking effects and those applied at 8 weeks from sowing have been even less effective on grasses. Though none of the treatments destroyed the young sward, it would appear desirable to delay spraying for at least 2 months from sowing.

MOSS IN LAWNS

One of the problem plants in lawns is moss. It seems to establish and thrive in soils of any degree of acidity. In fact any sward that weakens through poor management is likely to be invaded by moss.

Very recently I have commenced a trial at Hokowhitu Research Area where I am comparing dressings of Phygon XL at ½lb., 1 and 2lb. per 1600 sq. ft. with Santobrite at rates of 1oz., 2oz., 4oz., ½lb., 1, and 2 lb. per 1600 sq. ft. and sulphate of ammonia at 3cwt. per acre applied to moss covered with dew.

Phygon XL has proved efficient at the 1lb. rate under test at the Plant Diseases Station, while Santobrite is more usually employed by painters to suppress moulds on timber.

To date the results in my trial indicate that Phygon XL does not make much early impression on moss. Sulphate of ammonia has caused

a definite burn and the grass species have been stimulated to vigorous growth.

Santobrite has been quite spectacular in the early stages. At the heavier rates, 1 and 2lb., moss is badly scorched, flat weeds have been seriously affected and probably killed, clover has been eliminated, earthworms have been destroyed, and grasses somewhat checked but are recovering. At 4oz. and ½lb. moss is heavily checked, clovers are affected, but grasses appear to be normal. On the 1 and 2oz. areas moss has been severely burned, clovers have been checked, and grasses appear to be unaffected.

Unfortunately, insufficient time has elapsed to draw conclusions, but from the evidence to date it appears as though some very interesting information will soon be available.

CONTROL OF OTHER LAWN WEEDS

Work with MCP, 2,4-D, and 2,4,5-T show that Onehunga weed can be eliminated by dressings of 1lb. acid equivalent per acre.

It also demonstrates that we do not appear to be much further advanced in our knowledge so far as the control of sorrel and yarrow is concerned.

However, further research may ultimately give us a solution. Weed control has made enormous progress in the last few years. Whereas, only a short time ago we had to depend on such materials, with their attendant problems of application, as arsenic pentoxide, sulphate of iron, sodium chlorate, etc., today we have a wide and ever-increasing range of highly selective weedicides with which to work. The mere killing of weeds is not, in my opinion, the answer to the provision of good lawns and playing greens. Alone, it is merely a palliative, but associated with the use of good seed in the initial sowings, sufficient and efficient manuring to maintain the sward in a vigorous uniform condition, and regular attention to mowing and annual renovation, modern weedicides can produce excellent lawns and playing areas.

DISCUSSION

Q.—How old was the moss in these trials? Greenkeepers maintain the younger the moss the more susceptible it is.

A.—The turf had been down more than 20 years and the moss was certainly many years old.

Q.—Have you tried any treatments of Phygon XL on algal slime?

A.—There was no algal slime on this area. Some trials on algal slime will be laid down next spring.

Q.—Why drop the old standard treatment of sulphate of iron for moss control?

A.—Sulphate of iron kills moss, but is very hard on turf. It causes discoloration, hardening, and checking of the fine turf grasses. I believe in applying Santobrite to kill moss and then nitrogen to stimulate turf. I think sulphate of ammonia applied on a dewy morning is as effective as sulphate of iron in killing moss and has none of the disadvantages of sulphate of iron.

Comment: Santobrite is widely used in Auckland for moss control at a rate of 1oz. of Santobrite to 3 gallons of water applied to 60 square yards.

If the area is dominantly moss, reseeding must be carried out. To keep moss out sulphate of ammonia is also essential.

Santobrite is being used effectively against algal slime. Phygon XL has also proved effective against moss and algal slime, but is much more expensive for these purposes than Santobrite.