GRASS SWARDS FOR AIRSTRIPS AND PLAYING AREAS IN AUCKLAND PROVINCE

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Just on four years ago E. H. Arnold, Assistant Fields Superintendent, Department of Agriculture, Auckland, presented a paper to this Association's conference at Hamilton on the "Establishment and Maintenance of Swards on Airstrips on Farms in the Auckland Province". The survey he conducted on 132 airstrips selected at random revealed 'a very unhappy state of affairs, particularly with regard to the maintenance of a good grass sward. Within the last month or two we have seen in the daily press and national newspapers such headlines as "Ignorance Causes Dangerous Airstrips", "Lack of Care Main Fault", "Need for Improvement of Airstrips for Agricultural Aviation", "Air Accidents can be Prevented".

Not only does this state of affairs concern airstrips, but also many of our sports fields. Huge sums of money are expended on the layout of grounds and the comfort of spectators, but little thought is given to the production of good, hard-wearing grass swards for the players. Often we see our players depicted unidentifiable amid the mud and slush of some of our most prominent playing fields. This paper draws attention to a few basic principles affecting the maintenance of a good, hard-wearing turf.

Pasture grasses for maximum production on farms need **clovers**, largely for their ability to supply nitrogen. Such swards do not have a thick turf mat and are more open, with a high worm population, at higher fertility levels. This, in turn, yields a soft: spongy texture to the top few inches of the soil. This condition is in no way fit for heavy tramping or pounding of aircraft wheels. Thus clover must be kept out and the grasses alone left to form a tough mat. In other words the farming approach for pasture production must be dropped in favour of an entirely different approach for low production, more acid soil conditions, and a turf mat. This is the first and most important thing to keep in mind on all turf work. Next is the grass species which will give this hard-wearing mat.

Among our most hard-wearing grasses perennial **ryegrass** (*Lolium perenne*) takes pride of place. Apart from the more gentle sports swards for bowling, croquet, golf, etc., where the **chewings** fescue-browntop mixtures predominate, there is more need for almost a pure association for perennial **ryegrass** to stand up to the terrific punishment given by the class of rugged play exemplified

in our New Zealand Rugby scrums. If only play could be suspended for a whole season or restricted to dry weather, or for schoolboys only, it would be possible to establish a good perennial ryegrass turf mat with proper and adequate sulphate of ammonia-superphosphate treatment. On airstrips there is a better chance to attain the turf mat needed.

Browntop (*Agrostis tenuis*) and chewings fescue (*Festuca rubra* var. *fallax*.) though slower and more costly to establish than perennial ryegrass, form good wearing swards, but must be augmented with the ryegrass for increase in wearing qualities. Chewings fescue does well under very acid conditions, but with larger areas to contend with, general conditions, and likely treatment, it is doubtful if this grass is needed to any great extent. Browntop with some chewings fescue forms a good bottom in association with perennial ryegrass on airstrips and football fields.

Crested dogtail (*Cynosurus cristatus*) is useful as a binder and in quick establishment on many of our loose soils, but there is doubt as to its ultimate use once the perennial ryegrass and browntop take over. Certainly on fine greens it has no place.

Kentucky blue grass (*Poa pratensis*) is quite a good species on sandy areas in association with browntop and chewings fescue, and even ryegrass, but seed has been unprocurable for many years.

Indian doab (*Cynodon dactylon*) is most useful on sandy soils, and in some areas is the real answer to airstrips on loose sands where consolidation is most difficult to attain. Even on poor soils this grass does quite well. However, being a sub-tropical grass, its main period of growth is in the summer when it tends to dominate other species. It has a place on airstrips but not on winter playing fields. It has also a probable use on tennis courts in a hot climate where loose soils are experienced.

Other summer grasses such as the *Panicum* species are to be avoided, particularly on winter playing areas. All summer species tend to give coarse swards and for summer sports the finer turf species are required and should take precedence over all others.

Carpet grass (*Oxonopus compressus*), particularly in the north, forms a very dense turf mat. This, with its extensive rooting system, is fairly drought resistant, and on a well-drained Northland soil would be reasonably good for a winter playing area.

Paspalum (*Paspalum dilatatum*) is also a summer grower and, provided time is allowed for establishment, it can form a good, dense turf mat. Generally it is a patchy grower and therefore is of doubtful value. It needs more constant attention for control in summer. In association with ryegrass and with good summer control it could have a place in some winter sports turfs.

Kikuyu grass (*Pennisetum clandestinum*) is a very doubtful proposition under our conditions. Since it is very aggressive as a summer grower, it could have a detrimental effect on our swards, particularly for summer sports. On some golf fairways in Northland it has proved successful, but it needs constant mowing to keep it in control.

How can we achieve a good, hard-wearing sward of grasses? Whether it is for a playing area or an airstrip, the basic principles of achieving this end are the same, though there may be variations according to soil type and climate.

Let us first look at the soil preparation as a basis. Many areas have to be subjected to an immense amount of earth-moving machinery and final grading up. Invariably the amount of topsoil replaced is less than the original quantity removed. Heavy machinery has a remarkable habit of damaging the structure of the soil over which it has been working, and the replacement of a thin layer of topsoil on this hard, compacted layer is not in any way a suitable medium on which to grow a good turf capable of standing up to hard work. Whatever topsoil is put back must be knit in to the subsoil by proper mixing with a rotary hoe or, next best, the discs. After the necessary grading, levelling, and mixing is done, a pH test is most advisable. A pH of about 5.0 appears to be the most satisfactory, and even if it is within the 5.0-5.5 range on our Auckland soils the sulphate of ammonia dressings will help to reduce it.

On winter playing areas with heavy soils ample surface grade of up to 2 ft fall from the central ridge between goals to either touchline must be allowed for adequate surface drainage. This too enables good underground tile or mole drains to be put in close to the surface. The incorporation of sand in the top few inches of heavy soils before sowing down helps tremendously in keeping a drier surface and assists in getting over the "surface seal" problem so often experienced when the top inch or two tends to lose its structure and stability under severe trampling in wet conditions.

The fertiliser requirements of our Auckland Province soils differ vastly from that of most soils in other parts of New Zealand, and although we must supply nitrogen mainly by way of sulphate of ammonia, the phosphate requirements are much greater. Even for maintenance there is ample evidence on most of our volcanic and pumice based soils that the recognised standard 3 : 1 sulphate of ammonia-superphosphate mixture is totally inadequate as far as phosphate is concerned. This calls for a 2: 1 or even a 1: 1 mixture,

particularly where raw pumice or high phosphate fixing soils exist. The more frequent these applications are, the better chance there is of a closely knit turf being formed.

Such fertilisers as blood and bone must not be used, as *clovers* and *earthworms* are greatly increased and are destructive to soil stability in turf work. Lime must not be used for the same reason, except under special conditions of extreme acidity, and then only cautiously. Many a playing green in this area has suffered because liming recommendations based on Manawatu research work have been adopted. Under the Auckland Province climate and soil conditions the turf mat can break down very quickly with lime applications. Great caution must therefore be exercised in applying lime to reduce acidity on our soils.

What I have now mentioned regarding fertiliser and lime treatments clearly indicates how dangerous it can be to follow what may be clear-cut procedure backed up by research in the southern half of the North Island, Years ago I mentioned the need for research in the Auckland Province on turf, and today experience in many fields of sport has shown this is vitally necessary. It is time sports bodies in these parts made some move in this direction.

What I have previously said can be directly applied to airstrips. Everyone concerned with the control of airstrips **must** realise that a complete understanding of these principles is necessary if good surfaces are to be maintained. We have all had ample warning of the danger to life in neglect in laying down and maintenance of such swards. A seeds mixture which I find gives a good airstrip surface over a fairly wide range of conditions is:

Perennial ryegrass	....	....	....	.	...	lb per acre
Browntop	....					25
Crested dogstail						10
Chewings fescue	....	....	....		....	5
						5
						45

A more expensive and probably the ideal would be:

Perennial ryegrass	....	....				lb per acre
Browntop	....	....	....	....	....	10
Crested dogstail						10
Chewings fescue	....	....	.	...	....	5
						15
						40

At sowing down the emphasis must be on increased amounts of phosphate (4 cwt or more per acre) with 1 cwt per acre of **sulphate** of ammonia. Subsequent treatments should swing more to the

sulphate of ammonia so that the 1: 1 or 2: 1 proportion of sulphate of ammonia-superphosphate is used. Spillage of superphosphate or other fertilisers from aircraft on the strip generally tends to keep up the phosphate on a limited part of the strip, but the treatment of the strip as a whole must not be neglected.

In and around the loading area and within several chains of it, clover tends to become troublesome; in fact it can do so over most of the area if fertiliser treatments are neglected. Such clover patches are most dangerous; they can wreck a plane and even kill a pilot. Sulphate of ammonia tends to reduce clover, but the best way is to use a hormone such as 24D which will not only check the clovers but will kill off most weeds and particularly thistles. Use 3 lb acid equivalent of the ethyl ester of 24D in 20 gallons of water to the acre through the normal boom spray equipment. Such treatment will subdue the clovers and weeds and indirectly give a much firmer surface.

Control of grass growth is most important. Under no circumstances must the growth be allowed to get out of hand. Cutting hay or silage is disastrous on strips and completely destroys any turf mat. Long growth, incidentally, invites grass grub infestations, and, of course, on loose soil types DDT treatment is necessary. For good growth control a strip must be fenced off with fences well clear of the edges and also clear for landing and take-off at either end. Mob stocking with sheep is necessary; quick on-and-off grazing is preferable to set stocking, which tends to increase the clover. **Keep cattle and horses off.**

Once the strip is established and a good turf mat is obtained, at least three dressings a year of 1 cwt of phosphate and 1 cwt of sulphate of ammonia are needed to maintain it in tip-top condition. Other precautions which must be taken are drainage, water-tables cleaned, weeds controlled, adequate fencing, grass growth controlled, and exclusion of cattle, horses, and heavy traffic. Top-dressing with sulphate of ammonia just before a droughty period is to be avoided; it is better to use nitro-lime or other such form of nitrogen at that stage.

Airstrips which become dangerous from lack of care are a menace, and topdressing operators are reluctant to fly off them. Operators who refuse to use any strip on this account are to be congratulated. If you wonder why operators refuse to fly off your strip, or if your costs are too high because of low payloads, ask yourself this question: "Are the surface and turf in a condition which would allow me to drive my car comfortably at 40 miles per hour?" Try it and you have the answer.

If full payloads cannot be taken on each run this adds to the cost per ton of spreading. It has been shown that if 2 cwt less is taken in each 15 cwt payload at 10 tons per hour sowing rate, the cost can rise up to 5s. per ton.

Two examples have been most convincing:

- A. Before proper laying down and treatment, the cost of spreading was £3 18s. 6d. per ton; after laying down properly it was £2 15s. per ton (two years later), giving a saving of £1 3s. 6d. per ton.
- B. First working off after rough forming up, £3 10s. 6d. per ton; 12 months later and after improvements, regrading, and grassing, £1 17s. 6d. per ton, a saving of £1 13s. per ton. In this case a land-on "leg" was added to the loading end, and this accounted for a good portion of the reduction.

On a strip from where, say, 500 tons is spread at £1 less per ton, £500 could be saved, the whole amount it probably cost to put the strip down in the first place!

Farm costs must be kept down and this is one way where it is possible to effect an economy. The better the turf **mat** and the stability of the surface are, the longer will be the period in the year when flying operations can take place; in other words, good strips can be used at any time of the year. Lastly, good strips encourage operators to do the job when you want them to do it.

In conclusion, of the various factors such as soil type, contour, drainage, climate, grass species, fertiliser treatment, and management, it is now **recognised** from experience and observation in the Auckland Province that the dominating factors in attaining good playing areas and airstrips are *fertiliser treatments* and *management*.

These last two can either make or destroy the right type of turf under the existing conditions. With the factors of climate and soil differing so much from other areas, I am convinced it is unwise to rely wholly on research in one centre, and am strongly of the opinion that its lack in this province is a grave weakness.

DISCUSSION

- Q. (N. Clarke): Does Mr Murray recommend the same **pH** for mixtures of **browntop** and chewing fescue for both rugby grounds and airstrips? Also what methods of **rejuvenation** does he recommend?
- A. (a) The range in **pH** depends on the soil type. Good turf will grow on **pH** 4.5 on some soils.
(b) Renovation of football fields depends on the soil type. On heavy soil, sand must be used and worked into the topsoil, followed by undersowing and/or oversowing. As most renovation is done in the spring, dry weather can affect **oversown** species.
- Q. (P. D. Sears): Do you not have difficulty with water penetration?
- A. That does not seem to happen.

Q. (J. Holden) : On pumice there is considerable erosion of airstrips. Often furrows are laid in airstrips and these are filled after the grass has established and erosion danger has passed. How would Mr Murray deal with the rejuvenation of bowling greens which have become altogether too low in **pH**?

A. The usual recommended practice is to apply up to 1 ton of lime per acre and this has overcome the problem. However pumice soils usually require only one quarter or half of that. In this climate the sward will break down under too much lime.

Comment (Madden): **pH** is of no importance unless the sward is unthrifty. If the seed is sown across the airstrip instead of lengthways, rolling is reduced. Planes are unable to brake on a **clover** surface, especially a wet one. When nitrogen is required and acidity is 'rising, nitrolime or nitrochalk are better manures than sulphate of ammonia.

Comment (Murray): A bushel of barley sown with the seed will tend to hold the soil and guard against erosion. On pumice soils, it is better to have the fine pumice on the surface for binding.