PASTURES FOR WET LAND.

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I. INTRODUCTION.

In winter, low-lying lands alongside the Waikato River are flooded with water, and show little promise of' the surprising change to luxuriant pasture' which comes with the summer and the fall in the waters of the Waikato. For six months these areas lie covered in water many feet deep in places, to be succeeded as the floods recede by swards of grass of extremely high production and palatable to stock - some of them very palatable. The change is all the more remarkable in that at present. only very small areas, comparative to the large size of the flooded swamps of the Lower Waikato show this unusual transition, Most of the area in the summer grows a profusion of useless rushes,

Truly the grass family is a remarkable one. It provides species capable of living in a great variety of conditions. Representatives can be seen growing on the seashore in sea mud, on dry soils, at high altitudes, and there are also species suited to swamp completely covered with water for from half to all the year round. Little attention has been paid so far to the use which can be made of land flooded with water for long periods. Such land is usually considered useless, and endeavours are made to'drain it so that it will grow the grasses which thrive only on comparatively dry soils. Grass species which will grow without necessitating drainage - grasses forming carpets of green, fit to fatten cattle, produce. butterfat, graze pigs and lambs - are not very well known, and their use has not been considered much.

A natural home for these grasses can be seen in the lower reaches of the Waikato River.

II. THE LOWER BASIN OF THE WAIKATO RIVER.

Here the valley of the Waikato widens out to form flood plains. The river deposits most of its spoil near the banks which raises their level forming numbers of lakes and much swamp on both sides of the river. Throughout the swamps wander streams from the hills to connect directly with the river and to connect lake with river. Along the lake edges and banks of the tributaries and waters of the Waikato River, pasture plants suited to wet conditions have established here and there, in some places reclaiming fairly large areas, Most of the flood plain, which consists of thousands of acres, is covered with rushes, but there are also several acres of flax, and blackberry growing abundantly around the shores. The different pasture plants existing on the flood plain occupy different levels, from areas covered deeply in water in winter to land not covered with water. Their presence and prevalence is probably dependent on. several factors such as - the period of time the area is covered with water, the depth of water in winter, the moisture content of the soil in summer, competition of other swamp plants, the stocking of the area, and the rate of flow of the water at flood times. It is difficult to decide whether the line dividing the presence or absence of a pasture plant indicates its tolerance of the flow or depth of the water or the period of submergence, or whether it is the line marking its tolerance of other swamp plants which thrive under more or less wet conditions. Also, the stocking of the- area and the reaction of the different grass species to the degree of stocking must have a large bearing on their prevalence.

III. SOME MINOR SWAMP GRASSES.

On the dry land alongside the swamps, dry-land pasture-plants, such as brown-top, white clover, suokling clover , and sweet vernal, and paspalum, are common,

In the gullies descending to the flood-plain paspalum and Lotus major and Yorkshire fog are prevalent. In those gullies in which the water remains in the summer and flows but slowly, being stagnant in appearance, rushes are common, and competing with them strongly often is found the native punic grass (Isachne Australis), a rather unpleasant-looking grass with rusty green foliage which provides a fair amount of rather unpalatable fodder for stock particularly in the summer, In these gullies the water does not reach a high level for more than a few hours, and is seldom deeper than 3ft. , In the summer, being fed by springs, they seldom run dry. It is here, whether the drying-out occurs or not; that the native punic thrives, There the gully slopes to the flood-plain the native punic grass ceases to exist, 'for it apparently cannot live where submersion is fairly deep.

Paspalum dilatatum and Yorkshire fog cease abruptly at the commencement of the flood-plain proper, and do not even extend as far into it as the native punic grass. Paspalum dilatatum will stand flooding for but short intervals.

Agrostis stolonifera ventures to live a few yards farther out than Paspalum dilatatum, but its presence almost as abruptly ceases, It apparently will tolerate limited flooding and is a common and. valuable, though low-producing, pasture-plant for such conditions. Stock arc:: fond of it. It is commonly known as creeping-bent and possesses overground runners which root at the nodes, Its leaves and flowering-stem are typical of the Agrostis species.

Clovers do not exist far into the flood plain. Isolated plants of Lotus major and white clover are sometimes seen in summer in the deep flooded areas, but there is no doubt that they owe their presence to establishment from seed or stolons carried and left by the receding waters.

Meadow foxtail is seldom encountered. The best area I have seen is about one square chain in urea, situated in a hollow which is only flooded for a few hours or a day or two at the most in normal years. The meadow foxtail is dominant and the fodder produced is early and vigorous and appears nutritious. It starts flowering in August and after flowering the meadow foxtail keeps growing vigorously till the summer. In such conditions meadow foxtail appears to be a little earlier than. ryegrass and white clover, but not quite so palatable. It is on the borderline between dryland and wet swamp grasses.

Floating foxtail (Alopecurus geniculatus) is capable of living in very wet conditions in places covered with water for months on end, but it thrives best on areas less completely submerged, However it is not a vigorous grower and its growth period appears limited to the early summer months.

All the pasture-plants which have been mentioned are not capable of great progress on the flood-plain even at the shallower edges. They exist in competition with rushes, and even when aided by stock they are unable to suppress completely rushes and other weeds.

IV. SWAMP GRASSES OF IMPORTANCE.

There are grasses for which the swamp forms so eminently suitable a habitat that all other growth is suppressed or killed. One of these does not assert itself except where the land is covered with water over the winter, and two of them at least will survive flooding up to 6 feet or more deep in winter. However, it is only on land that dries out sufficiently in the summer to support stock that they are of economic value. Usually on such land the water *is only* covered 3 feet deep in winter, and almost all of the flood plain of the Lower Waikato Basin dries out sufficiently for stocking in summer. Growing as they do in summer in 8 soil rich in

food and. moisture their production is very great indeed, and they are of proved value for the summer grazing of stock when the ordinary pastures are dried up.

These deep-water swamp-grasses form pure swards. They eliminate competition by their vigorous growth. At the present moment they are limited to the margins of streams and places near running water, but they are gradually extending their range. It is possible that finally they will provide large areas for grazing of stock, These grasses do not merely provide "pickings" for stock, but can make fields of pasture which compare very favourably with our dry-land pastures in their production, palatability, and their lack of weeds. . One of these grasses is Poa aquatica.

(a) Poa Aquatica:

For more than a hundred years Poa Aquatica has been known in England. The following extract relating to it is cited from the Bath Agricultural Papers,1816.

"It is excellent fodder for milch cows".

"The nutritive matters of this contains a greater proportion of sugar than exists in any of the superior pasture grasses".....It does not grow freely from seed. The best manner of propagating it, according to my experience, is by planting the roots, which, from their creeping nature, soon increase the number of plants. The roots may be planted in the autumn or spring with equal success.

Yield 126,596 lb. of green feed to acre, and 75,957 when dried for hay.

"The Rev. Bartholomew Dacre of Mosely, has made several experiments on this grass, and the results prove that it may be cultivated on more elevated situations than has been supposed, and that propagating it by planting the roots is the best mode."

In dealing with bogs and moors Sinclair stated "When draining cannot be economically practised, the surface should be burnt and afterwards planted with Fiorin or with Water Meadow Grass (Poa Aquatica)."

Recently attention has been drawn to this grass in Australia and New Zealand.

In New Zealand it will grow on rolling country and in swamps. On dry land the plant does poorly, growing only a foot or so high. In swamps where the land is moist in the dry summers its leaves grow up'to five feet and it produces a tall seed stalk seven feet high. It resembles maize, the seed head being likened to the male flower of maize. The leaves are not as broad nor is the stem nearly as- thick as those of the maize plant. Nevertheless the leaf, which contains large intercellular spaces and has the true poa blade, is very coarse compared with leaves of dry land grasses. The colour of the leaves varies *from* a purple shade to light green. The *nearer* the shade is to light green the more vigorous is the plant growing.

Undoubtedly Poa aquatica is the tallest and heaviest producing pasture grass in New Zealand. it must yield up to 60 tons of green fodder per acre, because properly controlled by stock it does not cease *growing.* It is undaunted by winter frosts which can be fairly sharp in the Waikato swamps. Ten acres of winter growth have been known to keep 94 cattle going for two weeks in August. But it is in summer that its production is at its height. Grazed Poa aquatica has produced a growth of two feet in eighteen days during a dry summer. The ideal country for Poa aquatica is that which floods only about 1 foot in winter, so that it can be stocked at that time of the year. The plant sends out rhyzomes but also in deep water. the upright stems produce roots at the nodes. As the water falls the *stems* fall with it, the roots at the nodes striking the soil, anchor the plant which then again commences to grow upright growth. In deep water these stems are so massed together that they form rafts anchored by roots running down to the mud.'

In one bay of deep water a Poa aquatica raft of considerable size was subjected to sudden and severe flooding which tore the raft from its moorings and tossed it in a tangled mass to another place where it has again

anchored itself and flourishes anew. The bay where it previously existed is now free of Poa aquatica, Thus it is capable of' living in very deep water and can be seen growing in places covered several feet deep in the driest of summers, However it is not of much value there, It grows best where the swamp is kept moist throughout the year. In other words it likes its feet in mud or water all the time. The forest of runners is so matted that it will support heavy cattle in swamps where before its establishment they would be bogged or even drowned. Also", where it es tablishes, there is a gradual silting and rais-i ng of the bed of the swamp,

It probably has a higher feeding value than green maize because cattle fatten very well on it, but it is not a good milk producing grass,, merely holding the cows to their milk.

Poa ayuatica is a perennial grass. It sets seed quite freely, but its power of germination appears to be poor, It establishes best from seed sown in the spring. It has bnen known to establish quite well after a summer burn of swamp growth. Autumn sowing often results in no sign of the grass, The surest method of establishment is by transplanting, which in the Waikato can be carried out at any time of the year. Transplants carry vary well. Pukekos have the unfortunate habit of pulling out transplants, but this can be overcome by placing the plants deeply and firmly in the mud; If soil conditions are right it will soon struggle through the tallest of swamp growth and its conspicuous flower heads are often the first indication of its coming mastery. Poa aquatica is sensitive as to the fertility of the soil. It soon exhibits its dislike of its conditions by the purple colour of its leaves. It is doubtful if it will flourish on pest. As it does not thrive on dry soils there is no danger of its ousting the ordinary pasture grasses and clovers in that habitat.

It is interesting to notice how it smothers blackberry. I have watched for several years a large swamp at Kopuku which was practically one large blackberry bush. The Poa aquatica grows up and leaning against the blackberry, with its dense foliage, weighs it down, smothering it. In this way it will overcome blackberry twice the height of its leaves. The grass advances against the blackberry in a face, like a wave of water rolling over the shore, the only difference being that the wave is steady in its advancement and does not recede. Once smothered the blackberry, however tall and thick it was, has no chance to reappear. Poa aquatica can be aided in its attack against blackberry by firing along its line of march in the early spring. *Over 100* acres of blackberry at Kopuku have been replaced by this swamp grass which 10 years ago was represented in the swamp by a small patch *about* ¼ acre in extent.

Ungrazed Poa aquatica reaches its full height in the late summer, seeds in the autumn, after which there is a period of dormancy, as there is in many grasses after seeding takes place. It recovers in June where it again commences growth with increasing rapidity until in the height of summer its rate of growth is very rapid. Grazed Poa aquatica does not cease growing throughout the year. Even ungrazed Poa aquatica left to grow roughage has good fattening properties as cattle fed on this unpromising looking material will show. Cattle fattened on Poa aquatica have been known to top markets and have been reported by butchers as killing extremely well.

There is no doubt that Poa aquatica is a great pioneer. *Mr.* A. Graham Brown to whom I am indebted for information on Poa aquatica in Australia, states -

> "This introduced perennial'grass, which has valuable fodder properties, has found a most congenial new habitat in our swamps and morasses. Stock will graze it down to the mud or water level, and, cut on the green side, it makes good hay and ensilage. It

can, of course, be grown under irrigation, and should be grown in seepages in irrigation districts and in low-lying places that are filled with water in winter and can be kept moist in summer by irrigation water."

Poa aquatica has been made into ensilage in New Zealand with quite good results, but owing to the rough condition of swamps this is only possible where the land has been levelled by cultivation. To my knowledge haymaking has notbeen attempted here. The claim that it makes valuable hay appears likely to be true in light of the undoubted feeding value of the autumn roughage or as it is sometimes called the natural hay,

(b) Phalaris Arundinacea:

Phalaris Arundinacea or reed canary grass is a tall strong growing perennial grass capable of living in conditions where water covers the ground up to 2 or 3 feet deep. It will also flourish on swamps where the ground is free of surface water over winter. If its seed is sown in the ash of *burnt* blackberry bushes or if it is transplanted among them it will rapidly establish and destroy these plants on swamps. Even on patches which are dry underfoot in winter blackberry has been completely killed in one or two seasons by the aid of Pharlaris Arundinacea. It is more highly productive in the winter and early spring on the margins of the flooded areas than is Poa aquatica and withstands equally as well or better the fairly heavy frosts experienced in the Lower Waikato Basin. It holds its own against Poa aquatica invasion in its own habitat, although it is not so tall ingrowth and its total production is not as great. It is more palatable and of higher feeding value, being a milk producing food. There is only a few acres of this grass in the Waikato swamp and that is on a property at Ropuku belonging to Mr. Hawkin, who is very enthusiastic concerning the value of this grass, and to whom I am indebted for much information concerning it. I have not seen much of Phalaris elsewhere beyond one isolated clump and individual

plants. Because of its provision of milk producing fodder to replace blackberry and other swamp growth along the shores and in the flooded areas, I think it is a most valuable grass and it should be grown in preference to Poa aquatica on dairy farms. It should also be established along the shores of Poa aquatica swamps.

(c) *Paspalum Distichum*:

Paspalum distichum or' Mercer grass is probably the'most valuable of the swamp grasses. It supplies most of the fodder for stock grazing in the swamps of the Lower Waikato Basin. It has been established there for well over 30 years whereas Poa aquatica has been present for a much less period and it is only recently that the latter grass has made its presence felt. Mercer grass has the typical paspalum leaf with the typical paspalum flower, which in the case of Mercer grass consists of two spikes joined at their bases. Its leaves and stems are more slender than paspalum dilatatum, are upright in growth, reaching up to 3 feet high, but seldom attaining more than 18 inches. It has numerous slender stolons which with the rooting system make a firm bed for cattle, who when used to swamps will wander up to one mile from the solid ground browsing on this grass. Previous to the establishment of this grass, cattle could not vehture more *than a few yards on to the* same swamp. Like Poa aquatica it rapidly builds up the bed of the swam-p, for it steadies the flow of water allowing sediment to settle and its roots, stolons, stems and leaves lessen the scouring effect of rushing water. It supplies fields of over 100 acres consisting purely of this grass. It does not set seed freely and depends on its overground runners for its march of progress **against** the rushes of the swamp. **Even** on swamps covered with water 2 feet deep in the summer, it will send up its stems through this water to spread its leaves to the air and sunlight above. There is no doubt about its palatability, as it is greedily eaten by stock, It is more palatable and of greater feeding value than Poa aquatica, being as it

is a milk producing grass. Yet perhaps it is not quite as palatable as the more palatable dry land grasses, such as ryegrass, white clover, and paspalum dilatatum. It produces fodder in the summer and autumn and its production is probably much higher than paspalum in its own habitat. Where Mercer grass is established, there is in winter a bare expanse of water with no rushes or flax or other swamp growth. In the summer this view is replaced by a field of grass being grazed down to the mud or water level by numerous stock - I have seen lambs being fattened on this grass in dry summers. The only swamp plant liable to obtain a footing in a sward of Mercer grass is willow weed and it only progresses in areas where the choking of streams has prevented the subsidence of the flooded area sufficiently to allow of stocking, Paspalum distichum is a grass suited to heavy gracing, When the flooded waters recede in the late spring, a. bare expanse of oozing mud greets the eye. If one examines the mud carefully, stems will be found just at; or under the surface, Those are last year's stolons still alive and by which means the plant overwint ers the flood. The s tolons are quite loose for there are no anchoring roots, A little *later* sickly green shoots appear and in a few weeks the ground is a solid sward of this grass, being fed usually by fattening cattle or dairy cows, This growth continues till the first frost destroys the upright growth of stems and leaves or till the deepening flood overwhelms it. Possibly the reason why paspalum distichum is only found where water covers the land in winter, is because it depends on the flood to serve as a blanket against damage to the stolons by frost. It will live alongside Poa aquatica in the deeper waters but of course its range in tho other direction is not nearly as great. It is resisting successfully the challenge of Poa aquatica and under stock grazing conditions it probably would triumph in a struggle for existence against this giant grass. Events arc showing that Eoa aquatica prefers to tackle tall flax, vigorous blackberry and other swamp growth to this

harmless looki ng enough competi tor. 'Yet it is insidious in its march of progress. Like a good general it surrounds the enemy before attack: Stock in making tracks through the swamp jungle and therefore enabling the manoivres manoeuvres of Mercer grass, aids its march of progress against *rushes,* raupo, and other growth, In this way even young willow trees succumb to its smothering embrace.

It is difficult to distinguish Mercer grass from Paspalum vaginatum, which will live in the driest of conditions , occurring on clay tennis courts and also on roadsidea, It also occurs in highly productive dry land pastures where its aggressive smothering habit and negligible winter growth may make it a menace. From an Australian source I have learnt that paspalum distichum likes salty conditions and lives even in the ebb and flow in tidal rivers.

Paspalum distichum is a very shy seeder, being therefore propagated by transplanting. This can be most easily done by collecting the stolons in the late spring before they commence growth. These can be strewn over the area to be colonised and tramped lightly into the mud. Always pick an area that keeps moist or muddy over the summer.

(d) Glyceria Fluitans:

Glyceria fluitans or Floating Sweet Grass is another low growing award forming grass. It grows in areas covered more lightly with water in the winter than where Paspalum distichum thrives. It is often associated with this grass but it grows best on the raised banks alongside streams or rivers, where there is a continuous flow of water in winter. Paspalum distichum is to be found, for the main part, further from the streams where the water lies deeper and almost motionless. Glyceria fluitans differs from paspalum distichum in that it is not dormant in winter and lives with trailing stems moving to and fro with the flow of the water with the leaves floating canoe like on top of the water. In spring and

summer, when. .it throws a considerable amount of fodder it sets seed, upon which it depends for reproduction. In winter stock will wade up to their bellies to pick mouthfuls of this grass the palatability of which compares well with paspalum distichum. However, its winter production is infinitesimal compared with the summer production which seems to be much less than that of Mercer grass. It is a common weed in drains-where, however, its production seldom reaches any amount. It appears to require aid from the grazing animal before it assumes any degree of importance.

Then it is capable of forming valuable pure swards acres in extent alongside running streams, It is not as aggressive as the other three swamp grasses in fighting the swamp jungle. Once established, however, rushes have little chance of re-establishment,

V. SUMMARY.

Thus we have four valuable grasses which will reclaim alluvial swamps at practically no cost or trouble. Each has its own means of existing amongst the rising flood. Poa aquatica will usually grow as fast as the flood rises and if its stem growth cannot keep pace it will float on top of the water and supplement this by its root growth. Paspalum distichum discards roots and upright growth and overwinters by means of its stolons, which lie dormant in the muddy bottom. Glyceria fluitans floats its leaves on the running water, being built to stand swift flowing water. If the flood goes higher, however, than its leaves can float, its chance of survival is small. Phalaris arundinacea, like Poa aquatica, tries to keep pace with the rising water, but unlike Poa aquatica, if the flood outstrips the growth of the stems, it is drowned; Hence it does not appear in parts covered as deeply in winter as Poa aquatica or paspalum distichum.

The soils of the Lower Waikato swamps are for the great part formed by silts deposited by the Waikato

and its tributaries, but there are also large peat areas. The swamp pastures exist almost entirely on the silts. There appears to be some doubt as to whether the peat soils can be reclaimed by swamp grasses.

Of the alluvial areas, the alternative to non-expenditure of money *on* drainage and the establishment of summer producing swamp-grasses is the riddance effectively of the surplus water. If drainage is not completely successful so that ryegrass of high production can beestablished,the result will not be satisfactory. Half-drained land supports only rushes with a weak competition by grass and clover, and is of much poorer total potential production than land in its natural wet state. It has a virtue, however, which the undrained swamp does not always possess, in that the area is able to carry stock every month in the year.

If the owner of a flooded swamp which dries out sufficiently in the summer to support stock wishes to make the area productive, he has two ways of' doing so. He can adopt the well-tried method of drainage to,dry the land so that it will support grasses suitable to dry conditions, or he can establish grasses suited to the land in its natural state, By effective drainage he will obtain production from the area the whole year round, Colonization with swamp-grasses may result in production only during the summer months. Th.: establishment of ryegrass white clover swards can be brought about only by much labour in the erection of stop-banks, digging of drains, preparation of a seed-bed, and expenditure in the purchase of a pumping outfit; and the continual demands maintenance makes in the cleaning of drains and the pumping-out of the water must not be overlooked.

The establishment of swamp-grasses is not a costly or a laborious undertaking. As yet, very little of it has been done, and the great swamp-pastures of today owe very little to man for their presence, Beyond a little fencing, the expenditure of money entailed by

the establishment of a wet swamp-pasture is practically nil.

After all, the drainage or non-drainage of swamps is decided by the need of the farmer for winter or summer fodder. If not much dry- land is available for winter feeding of stock, then drainage to make more dry land is probably the correct step to take. If the farm comprises for the main part dry land from which plenty of surplus hay and silage can be made, then the colonization of the swamp with grasses natural to these conditions may well appeal, To many, the non-drainage of these great areas is considered a great waste of potential production of farm-prodwcts. Yet these areas are the safety-valves of the great Waikato River, Too often has the close confinement of great rivers created problems through the silting and continued rise in the river-bed, the inevitable consequential flooding, and the loss of stock and property and risk of life.

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DISCUSSION.

E.B. Levy:

Mr. Bell's paper is a very fine explanation of pasture plants for these swamps.

S.H. Saxby:

I would like to compliment Mr. Bell. As far as the South Island is concerned Mr. Bell's findings fit in admirably with the exception of certain grasses which will not thrive down there at all. I refer to the various paspalums. Glyceria is probably one of the most dominant grasses on our wet pastures. There is just one thing I would like to' draw Mr. Bell's attention to, I think it may not be generally recognised but Poa aquatica as you refer to it may be Glyceria aquatica. Dr. Allen terms it Glgceria aquatica not Poa aquatica. Another thing., Mr. Bell did not say much about meadow foxtail. I think it would do on the lower moisture content parts of the country he has been considering as it would in Otago, I would be quite glad to hear as to the way in which meadow foxtail is regarded up here.

R. McGillivray:

Mr. Chairman, I wish to congratulate Mr. Bell on his paper. I want particularly to refer to Glyceriaaquatica. There is one quite good stand of it on the West Coast of the South Island. I think the plants were planted about 1928 and it certainly lead to the consolidation of that swamp and it has spread very rapidly. I know there is one in South Otago - as a matter of fact I got the plants back in 1912 - Mr. Saxby will no doubt be able to find that and that lot gave a tremendous lot of feed. It is often thought it is quite unpalatable, It is a good and palatable plant. I have seen Romney ewes going into the swamp for it. It seems to be quite valuable.

H.E. Annett:

With regard to meadow foxtail we have a fair amount of foxtail in places in the Waikato. We see quite a lot of it out Orini - Tenfoot Road way. Stock seem to do quite well on foxtail but as soon as grazed meadow foxtail entirely disappears. Where you have close rotational grazing it goes out.

J.E. Bell:

I made brief mention of foxtail but we do not see much of it up here. The cattle do not seem to be very fond of foxtail. It probably has a place in between the dry soils and the wet swamp pastures. I agree with Dr. Annett, it has not a very good place on dry land pastures.

P.W. Smallfield:

In the Waikato the main foxtail is on the Te Kowhai silt loams that are not particularly well drained, and are moist. There is a good deal of foxtail in the pastures on this farm, In North Auckland there are areas of meadow foxtail near Ruawai. They are not particularly high producing pastures.

J.M. Smith:

In the South the growth is much later than in the North, Mr. Bell's paper mentioned June as the commencement of growth of Poa aquatica. It is just in its early stage down South. It seems four months later down there as to up here.

Mr. Jacques :
Are there any legumes? There is an instance of strawberry clover near the Coast where the land is submerged at long periods at a time with somewhat brackish water. I wonder - the depth of the water is not more than a foot - I wonder would, strawberry clover have a place?

JBEe l l :
I do not know whether strawberry clover would live under those conditions, Lotus major will not live in very wet conditions.

E.B. Levy:
I do not think strawberry clover would either.

Mr. Vosper :
Is there any mortality of stock in reaching these plants?

J.E. Bell:
One farmer had considerable trouble With stock being bogged through reaching into inaccessible places. In the Waikato stock seem to be fairly safe. There is another point - it may choke drains. A farmer needs to be careful in considering establishment of Poa aquatica for it may choke up his drains. Apart from that instance I have not heard of stock being bogged or drowned through Poa aquatica,