MANCHURIAN RICEGRASS RESEARCH

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Summary

Manchurian ricegrass (*Zizania latifolia*) is a weed of river banks and farm and road drains on and around the Northern Wairoa River. This article discusses some aspects of the ecology of the weed and its extent of infestation. A summary of previous Department of Agriculture research aimed at controlling the weed and details of current research are outlined.

GENERAL

MANCHURIAN RICEGRASS (*Zizania latifolia*) was introduced about the turn of the century in the ballast of a ship, arriving probably to unload bricks and to load kauri timber. It established itself on the banks of the Northern Wairoa River between Te Kopuru and Dargaville.

It is a very tall, coarse perennial growing to 12 ft high and has a strong, deep rooting system consisting of bulky spreading rhizomes. These rhizomes have been observed to spread up to half a chain before producing a tiller. (This fact is important in determining trial plot sizes.) It flowers sparsely and when it does, in November and December, the long, branched panicles are characterized by the lower branches spreading and bearing mainly staminate spikelets. The upper, ascending branches bear mainly pistillate spikelets. Mature seed, if dropped into the water, is carried by tidal action both up and down the river to establish new centres of growth (Arnold, 1959).

Manchurian ricegrass grows most vigorously in soft mud and, wherever it does establish, it intensifies the wet, soft soil conditions which are more favourable for its spread. It blocks drains and destroys stopbanks (Arnold, 1959). Unless stock are really starving, they will not eat it. It appears to grow in fresh to very slightly saline water. On the Northern Wairoa River, it grows between Tikinui (20 miles south of Dargaville) and Kirikopuni (32 miles north-east).

Tidal action has been observed along this length of the river. At Tikinui, surface water is not saline at lower tide and can be slightly saline at high tide. Every drain in which Manchurian ricegrass is growing, that has been observed by the writer, has shown tidal fluctuations.

Manchurian ricegrass has previously been reported in the Hauraki Plains (Arnold, 1959) where it was planted from the Northern Wairoa River. This infestation has not been eradicated, but has spread very little (G. J. Batten, pers. comm.). A further infestation has recently been found by the writer one mile west of Helensville adjacent to the Kaipara River. This infestation, growing in a small drain which runs parallel to Highway No. 12 on its north side, is east of the road bridge over the Kaipara River. It is not a vigorous infestation (growing no more than five feet tall) and

appears as if it could have been brought to the area by some one carrying sods of pampas from the Northern Wairoa for planting beside this drain. The Waitemata County Council has been informed of this infestation.

PREVIOUS OBSERVATIONS

A Department of Agriculture report in 1937 stated: "Eradication does not appear to be possible. Control of the present areas together with the prevention of its further spread, must therefore, be the consideration. The suggestion which offers itself, is to make some attempt to confine the grass to those areas upon which it is growing at present. This would necessitate the planting of suitable evergreen shade trees 5 ft or 6 ft inside the present line of the grass. . . . Chemical methods of treatment are to be considered a waste of time." (Arnold, 1937.)

At the 12th N.Z. Weed Control Conference, it was reported: "Shade trees inhibit its growth and stop its spread. *Pinus radiata* can be planted on firm ground before the ricegrass spreads and will prevent its further advance." (Arnold, 1959.)

It has also been stated that giant or bamboo reed (*Arundo donax*) will control the spread of Manchurian ricegrass (Arnold, 1959).

ERADICATION

No method of eradication has been found. A farmer on the Ruawai Flats, just south of Dargaville, has removed Manchurian ricegrass from small drains on his property by continuous mowing, regular mechanical drain cleaning and spot spraying with paraquat, areas that could not be mown. He attributes most of his success to the regular mowing and mechanical cleaning rather than to any chemical treatment.

On roadsides, regular mowing appears to keep road verges free of Manchurian ricegrass.

CONTROL

The most satisfactory control has been with shade-producing plants — *Pinus radiata* and *Arundo donax* have proved reasonably successful. *Arundo donax* can be established equally well when either planted vertically as rooted cuttings or horizontally as canes.

The Hobson County Council report that they are not attempting to use *A. donax* to control Manchurian ricegrass because it is claimed that a workman handling the canes was cut and apparently poisoned by the bamboo (A. Morris, pers. comm.). *Arundo donax* shows no toxic effect on sheep (J. A. Hunter, pers. comm.).

Seven trials have been conducted by the Department of Agriculture since 1950. No chemical has been found which will control or eradicate Manchurian ricegrass. Many will destroy the topgrowth completely but, without follow-up chemical application, the weed will be fully recovered within one year. The chemicals used in these unsuccessful experiments have included the following (all rates in active ingredient per acre).

- (1) Sodium chlorate. Five applications each of one ton over four years on both cut and uncut stands.

- (2) Trichloroacetic acid. Five applications each of 300 lb over four years on cut and uncut stands.
- (3) Dichloropropionic acid 20 lb per acre and amitrole 20 lb per acre followed by burning and heavy rates of these two chemicals mixed (20 lb of dichloropropionic acid + 15 lb amitrole).
- (4) Dichloropropionic acid 15 lb with and without wetting agent, No difference between these treatments was observed.
- (5) Dichloropropionic acid 15 lb + amitrole 5 lb mixed, applied at monthly intervals throughout a year. No difference between times of applications.

Dichloropropionic acid appears to knock the Manchurian ricegrass initially more severely than amitrole. This could be a salient point if chemical treatment is necessary to allow biological control with *A. donax* to be initiated.

It appears from trial work that tall growth is more susceptible to chemicals than vigorous regrowth.

One trial on Manchurian ricegrass had a replicate on a wet area (where ricegrass grew in 3 in. to 6 in. water for most of the year) and one replicate on a drier area. All chemical treatments were more effective on the replicate where the weed grew on dry ground.

CURRENT RESEARCH WORK

The Research Division of the Department of Agriculture is conducting a trial at Aratapu. It is designed to determine the effect of two chemicals (paraquat and amitrole) with and without burning. This trial was laid down in June, 1965, on the bank of a small drain. Manchurian ricegrass was growing 10 ft out from the drain into pasture, and the height was approximately 8 ft. Four replications of two rates of paraquat (2 and 6 lb) and one rate of amitrole (10 lb) with a control were laid down on plots, each one chain in length. All chemicals were sprayed with a gun and were carried in 200 gal water per acre with one pint of non-ionic wetting agent per acre. In October, two of the four replications were burned. In November, all plots were resprayed. All paraquat plots were sprayed at 1 lb and the amitrole plots resprayed at 10 lb.

In January, 1966, the trial showed a superiority of amitrole as a treatment. The unburnt replications appeared to show the greatest effects of spray treatments with amitrole being outstanding at this time. When Manchurian ricegrass had been burned, regrowth vigour was good although amitrole was again superior to paraquat in checking the regrowth. It appears that, where stands were not burned (and, therefore, retained a high proportion of external dead material), self-shading resulted in a weakening of the regrowth. The opening of the stands by burning resulted in an increase in the percentage of green tissue on the plots and a decrease in the effectiveness of both treatments. The Manchurian ricegrass recovered through the summer, and in March, 1966, no discernible differences could be detected between plots. At this time, the trial was resprayed with paraquat at 1 lb and ½ lb and amitrole at 10 lb on to regrowth that was 8 ft tall. Desiccation, observed on the heavier rate paraquat plots, was superior to that on the lower rate. The March amitrole effect appears to be more severe than that effect produced in June or November.

CONCLUSIONS

- (1) No chemical yet tried will eradicate Manchurian ricegrass.
- (2) The height of the water-table at sites on which it grows apparently inhibits (owing to dilution) the effects of hormones, and chemicals aimed at soil sterilization.
- (3) Current work indicates that amitrole retards growth for a longer period of time than paraquat, although paraquat is quicker and more severe in killing top growth.
- (4) Regular mowing will give control and probably contain its spread.
- (5) Burning, if not followed by some other mechanical means of control (*e.g.*, mowing) reduces ground cover of dead material and encourages more vigorous regrowth.
- (6) *Arundo donax* established in the path of advancing Manchurian ricegrass will prevent its spread.

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REFERENCES

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