MANCHURIAN RICE GRASS

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SUMMARY

MANCHURIAN rice grass, introduced from Asia in ship's ballast 60 years ago, now extends along 30 miles of the Northern Wairoa River. Its coarse, aggressive growth into side streams and drains has destroyed the drainage of many acres of pasture. Mistakenly it was transplanted to the rivers on the Hauraki Plains. Here it is now a menace. Investigations amply demonstrate that *Arundo donax* will contain its spread and smother out existing stands, making the land available for pasture. Chemical control has been investigated, but so far without success. Dalapon, however, appears promising and further work with this and new formulations is planned.

About the turn of the century, introduced in the ballast of a ship arriving to load kauri, Manchurian rice grass (*Zizania latifolia*), a native of Asia, established itself on the banks of the Northern Wairoa River.

This very tall, coarse perennial growing to 10 ft high has a strong, deep rooting system and far-spreading rhizomes. It flowers irregularly and when it does, in November and December, the long branched panicles are characterised by the lower branches spreading and bearing mainly staminate spikelets. The upper ascending branches bear mainly pistillate spikelets. Mature seed if falling into the water is carried by tidal action both up and down the river to establish new centres of growth. At Hoanga, from one seedling, Manchurian rice grass, despite being cut back and burnt off several times, covered an area of over 1½ square chains after 15 years.

Growing most vigorously in the soft mud from just below low tide level on the banks of the river and its tributaries, it spreads up water courses and drains, blocks floodgate outlets, and destroys stopbanks. The strong-growing, spreading rhizomes penetrate into and through the stopbanks, opening them up in summer to allow water to seep through. During the winter months the stopbanks under the dense canopy of growth become saturated and slump. The drainage system is destroyed and the grass encroaches rapidly into the wet, soft areas created. Wherever Manchurian rice grass grows it produces and intensifies wet, soft, soil conditions more favourable for its further spread in good pasture land. It advances insidiously each year. At Awakino Point, Dargaville, the grass has spread in a wide face through a stopbank, across a 4 ft deep drain, and then 21 ft out into a field, all in four years.

Shade trees inhibit its growth and stop its spread. On one Awakino Point farm where pines (*Pinus radiata*) were planted on firm ground before rice grass spread, occurs a break in an otherwise continuous belt. New Zealand flax (*Phormium tenax*) holds up its spread, while Kikuyu grass (*Pennisetum clandestinum*) can be seen holding and smothering it. Unless stock are really starved they will not eat it. Rice grass results in a good deal of costly mechanical cleaning of infested drains with short-lived and little benefits.

Manchurian rice grass extends in continuous belts up to 3 chains wide and in smaller patches for 30 miles along the Northern Wairoa River from the Awaroa Creek, below Ruawai, to within a short distance of Pukehuia. It has penetrated up side streams—for example, Aratapu Creek, 1 mile, and Kaihu River, 5 miles—and into numerous drainage canals and farm drains. About 2½ years ago J. E. Bell, Fields Superintendent, Auckland, observed an area covering half an acre growing on the banks of the Piako River near the end of Limeworks Road, and also a small patch on the banks of the Awaiti Canal on the Hauraki Plains. Later G. L. Banfield

Manchurian rice grass.

and G. J. Batten, instructors in Agriculture, Thames, reported and investigated infestations on the Waihou River. At least 30 patches from a few square yards to 4 square chains in extent grow at the outlets to floodgates and drains down and up the river from Turua. From inquiries made it would appear that 20 years ago some misguided drainage official, lacking knowledge of Manchurian rice grass, had plants put in with the idea of protecting the drainage outlets. The grass is now a menace.

Following an investigation I made in 1937 of the incidence of this menacing grass on the Northern Wairoa River, I reported:

"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 of the present line of the grass. Trees tolerant of wet conditions would have to be selected. Fencing would be necessary. This, together with the land abandoned as useless and the area occupied by the shade trees, would make the control expensive. If flood-water causes fresh centres of the grass to be established inside the line of trees, these new plants should then be immediately treated by spading. Except for small areas, such as the outlets of drains, chemical methods of treatment are to be considered a waste of time."

For many years my search continued for a suitable evergreen shade tree or plant tolerant of the wet conditions found between the stopbank and river. After observing the growth habits and smothering effects of Giant or Bamboo Reed (*Arundo donax*) on growth in a drain on the Ruawai Flats I arranged for trials with this and other plants at the Northern Wairoa Demonstration Farm, Dargaville. Multiple rows outside of the stopbank were planted of *Arundo donax*, New Zealand flax, pampas grass (*Cortaderia dioica*), and bamboo (*Arundinaria macrosperma*) between an advancing face of rice grass and the stopbank and also among cut-down rice grass already growing on to the stopbank. *Arundo donax* established most rapidly and within three years had provided a good barrier and shading canopy to arrest the ingress of rice grass. On the cut-back area, within five years, it completely replaced the rice grass growing in a morass of deep mud and changed the area into dry firm soil which did not soften even during spring tides. New Zealand flax developed too slowly to form an effective barrier, while the conditions were too wet for bamboo and pampas grass. Where rice grass completely blocked an outlet drain causing the banks to slump down into a morass of almost bottomless mud, a single row of *Arundo donax* was planted along each side of the drain. Within a few years the *Arundo donax* completely smothered out the rice grass, and now covers a weed-free drain with stable banks and which requires a minimum of cleaning. One of the difficulties in establishing *Arundo donax* in existing rice grass stands is the need to remove the top growth for several years. To avoid hand cutting dalapon might be employed.

Chemical methods to deal with rice grass are being investigated by the Department of Agriculture. Sodium chlorate in total applications of 3 tons per acre over 3 years, TCA at 900 lb, and monuron at 200 lb, some on cut and some on uncut areas while destroying in some instances considerable amounts of top growth, have not proved effective and regrowth has subsequently come away. Work with dalapon is proving interesting.

D. A. Newman, Instructor in Agriculture, Dargaville, in October 1957 treated an area on a drainside with 20 lb of dalapon plus 5 lb of amitrol with a wetting agent. Growth died back slowly and in October 1958 all appeared completely dead. However by January 1959 regrowth from rhizomes was up to 3 ft high.

The Departmental weed team in May 1958 sprayed half an acre on the Piako River with dalapon at the rate of 42 lb per acre in 210 gallons of water with a wetting agent. The top growth, apart from a narrow under-sprayed fringe at the water's edge, was destroyed, but in May 1959 re-

growths up to 3 ft high had come away. These results are promising, but in some trials, even where a wetting agent has been used, dalapon while knocking back tall growth hardly affects short growth as typified by regrowths. Follow-up work requires investigation into both more effective wetting agents and the possible use of 2, 3, 6-TBA and fenac.

Q.—Have any trials been carried out with burning after treatment with dalapon?

A.—No burning has been tried. However, more work is required with follow-up treatments on the short regrowth.

Q.—Is *Arunda donax* frost tender?

Comment: *A. donax* grows in Palmerston North and appears to resist frosts.

Q.—Has amitrol been tried?

A.—Some trials have been put down recently. However, results from these will not be available for some time.

Q.—I consider that the time of application of chemicals is all-important, even more important than the actual rates or ratios used. Has any work been done on times of application?

A.—No exhaustive work has been done on this aspect, but it is the intention to do some work on this in the future.