THE PROBLEM OF PERENNIAL GRASSES IN IRRIGATED REGIONS

by

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In the Murrumbidgee Irrigation Area of New South Wales, the growth and spread of perennial grasses in ditches and along their banks is the most important weed problem facing both the Water Commission authorities and the farmers in that area.

Four species, namely, Paspalum dilatatum, P. distichum, Phragmites communis and Typha angustifolia cause the most trouble. The Typha sp. infestations and control will be dealt with separately and I shall restrict myself to the three first species.

The main objection to these grasses is the impedance of the flow of water and the silting they produce in the channel systems.

Before considering some results obtained by C.S.I.R.O. in experiments designed to control these grasses, it is worth while to consider the growth habit of each of these three species.

Paspalum dilatatum is an upright bunching grass, very hardy and adaptable. It requires moist but not wet soil generally, yet it grows well in beds of shallow drainage channels, or channels of intermittent flow. Its growth is best where organic matter is abundant and where the level of fertility is high. Paspalum dilatatum commences active growth about November and grows vigorously throughout the summer and early autumn becoming dormant during winter. Kuppers (1948) studying the seasonal variations of crude carotene and other constituents of P. dilatatum as indications of its seasonal growth, found three peaks in growth curves, approximately in early spring, mid summer and early autumn. The plants flower in summer and autumn, and inflorescences grow to 3 ft. or more. Each plant develops several flower stalks with the elbow near the ground, and tending to recline. It produces abundant seeds but their germination is often poor because the ergot fungus disease Claviceps Paspali attacks or destroys them. Ray (1937) found that seeds lost their viability with time, germination

decreasing markedly after a one year period.

Lovvorn (1944) reported that P. dilatatum is fairly sensitive to defoliation. This can be explained from both a morphological and a physiological point of view, since P. dilatatum is an upright grass, and very little photosynthetic tissue remains after frequent defoliations. New growth is initiated therefore at the expense of previously stored reserves. Other investigators have found that frequent defoliations are more effective in reducing yields under conditions favouring rapid regrowth.

Paspalum dilatatum lines most of the supply channels in the Murrumbidgee Irrigation Area. In large channels it is causing no problem and helps to bind the soil on the water's edge. In smaller channels up to 8 ft. wide the overhanging seed stalks meet in the centre and may cause serious reductions in flow.

The most common method of control in the area is scything. It necessitates 3-4 operations during the growing season, on occasions when other work is very pressing. Hoeing in the winter months is practised to some extent, and could be more successful considering the shallow root system of Paspalum, if seedling regrowth next season was not such a problem. Seeding to some competing pasture following hoeing may help, but has not been practised. Grazing is not common in the orchard farms but occasionally goats do an excellent job where they are made to pasture rationally.

A very comprehensive study of the effect of oils as herbicides on P. dilatatum was carried out by Myers (1952-53) and his results indicate an antagonism between the speed of contact injury and inhibition of regrowth. Diesel distillate at rates up to 600 gals./acre was found effective, but seedling regrowth was a problem during the following season.

Tests with Maleic Hydrazide at rates of 4-16 lbs./acre caused an effective inhibition in growth of seed stalks for a period of 2-4 months. This however is not quite long enough for a full watering season. Further experiments will show if retreatments are to any advantage.

Field trials in the Murrumbidgee Irrigation Area using various soil sterilants applied in early autumn on well established P. dilatatum showed the following summer that: Borax or Borascu at rates as high as 3,000 lbs./acre reduced the Paspalum stand by 40% only. Atlacide at rates of 1,000 lbs./sodium chlorate reduced it by 70%. Polylor chlorate and chlorax at 1,600 lbs./ac. reduced it by 70%.

These treatments seemed very encouraging in spring and early summer, but their effectiveness decreased in the summer and in most cases were quite ineffective by early autumn. Arsenic pentoxide at 800 lbs./acre was extremely effective two years later; stands being reduced by 96% and almost complete soil sterilization obtained. Sodium Trichloroacetate at 100-200 lbs./acre completely killed the established Paspalum, and had a residual soil toxicity sufficient to inhibit growth of seedlings during the following summer months. Lactuca scariola which is T.C.A. tolerant took over the plots, and with its protection Paspalum seedlings were able to establish again within a year.

Paspalum dilatatum seeds affected by the ergot may cause a disease among cattle known as "Paspalum staggers." This is not a fatal disease generally, and apparently it can be remedied by moving stock to other pastures and has hardly been known on the Murrumbidgee Irrigation Area.

The other member of the Paspalum family is not as well studied because it is not a good pasture plant. Paspalum distichum is found along canals and rivers; it is water loving, but like P. dilatatum it can stand dry conditions fairly well. It usually establishes itself on edges of banks and sends runners of up to 10 ft. in length across the water surface. It is said to be able to grow up through 2 ft. of water. Its ability for rooting at nodes allows it to establish quickly in shallow channel beds, reducing flow considerably and causing silting to occur. It has been reported to be more competitive than P. dilatatum. Scything up to four times a year is the normal method of control in the Murrumbidgee Irrigation Area. Preliminary tests with T.C.A. at 100-150 lbs./acre were encouraging but not completely successful. Similarly Maleic hydrazide inhibition was successful in the greenhouse but not in the field.

Phragmites communis (common reed) occurs in temperate to tropical regions of the world, along banks of streams, lakes and swamps. It is usually present in moist marshy conditions but occasional isolated patches may be noted in drier surroundings. This latter occurrence can often be traced to small portions of rhizomes being introduced in earth filling or straw packing. These pieces of rhizome can shoot readily and therefore constitute a major source of colonization. If left undisturbed in wet conditions, Phragmites spreads rapidly. It propagates mostly by underground runners. Smith (1948) in the Moreton area of Queensland, noted that cut ends of rhizomes at the bottom of a 6 ft. hole had developed within two weeks shoots of up to 6 in.

quite healthy in appearance. Plants reach up to 12 ft. in height, have long stout roots sometimes creeping over moist soil. They form mats of roots at every joint, whether imbedded in the soil or not. Phragmites grows on the banks of channels but it can spread in the bed itself, with a maximum water depth of approximately 4 ft.

The actual method of control in the Murrumbidgee Irrigation Area is scything which necessitates 2-3 operations a year. In the past, careless cutting has probably spread the weed infestation by creating a source of clones to colonize new areas. Smith (1953) found that hand chipping, cutting the stalk slightly above ground level was a better method of control. This causes a stimulation of the top-most buds of the culms, giving rise to weak shoots. He also found 2,4-D/2,4,5-T mixtures very effective, but it seems he obtained mostly a contact action effect. This contact effect was also noted in preliminary experiments in the Murrumbidgee Irrigation Area by C.S.I.R.O. T.C.A., reported by Smith to be ineffective, is in fact very encouraging in autumn applications in the Murrumbidgee Irrigation Area at rates of 100-200 lbs./acre. M.H. tested also in the Murrumbidgee Irrigation Area proved effective in greenhouse tests and on infestations occurring on dry land areas. However, poor results were obtained on plants growing in water.

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