ATRAZINE IN KIKUYU GRASS ESTABLISHMENT: A PRELIMINARY STUDY

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ABSTRACT

The effect of atrazine on the establishment of kikuyu grass (Pennisetum clandestinum *cv. Whittet) and the value of an activated charcoal protective seed pellet were investigated in a glasshouse pot experiment. Rates of atrazine up to 4.5 kg a.c. ha^{-1} were used.*

Number of kikuyu grass seedlings 40 days after sowing were not reduced by treatments of up to 4.5 kg a.c. ha^{-1}. Yield improved up to 0.45 kg a.c. ha^{-1} but declined beyond this. Both population and yield of broadleafed weeks were markedly reduced at 0.45 kg a.c. ha^{-1}. Population of grass weeds was reduced at 2.7 kg a.c. ha^{-1}, but yield reduced by 70% at 0.45 kg a.c. ha^{-1}. There was a significant improvement in yield due to charcoal pelleting at 1.3 kg a.c. ha^{-1} but not at 2.7 kg a.c. ha^{-1}.

INTRODUCTION

Kikuyu (*Pennisetum clandestinum* Hochst. ex. Chiov.) is a valuable grass in high fertility situations in Southern Queensland. Prior to 1972, spread of the species was largely restricted to vegetative propagation. In 1970 the cultivar Whittet was registered, and by 1972 seed was commercially available. Poor establishment was common in many Whittet plantings due in part to excessive weed competition. The chief weed species was crowsfoot grass (*Eleusine indica*).

A common practice designed to reduce this weed problem is late planting (March/April) when summer annual weeds have largely completed their cycle. An alternative could well be through the use of selective herbicides. Atrazine is a cheap, broad spectrum pre- or post-emergence herbicide, shown to have a selective effect on a number of tropical grasses (Hawton 1976, Scattini 1978). Activated charcoal has been used to protect susceptible crop species from the effects of triazine herbicides (Ahrens 1965). The banding procedure of Linscott and Hagin (1967) is of little value when the seed is broadcast, as is the case in most Whittet plantings. Seed was therefore coated with activated charcoal in an endeavour to limit the effect of atrazine on the developing seedling.

This glasshouse pot experiment investigated the selective effect of atrazine on kikuyu establishment, and the value of an activated charcoal seed pellet in reducing the effect of atrazine on the young seedlings.

MATERIALS AND METHODS

The design was a three replicate randomized block of twelve treatments. In nine of these the seed was charcoal pelleted and the remaining three were unpelleted. The atrazine treatments were nil, 0.45, 0.9, 1.3, 1.8, 2.2, 2.7, 3.6 and 4.5 kg a.c. ha^{-1}, and in the unpelleted group, nil, 1.3 and 2.7 kg a.c. ha^{-1}.

Thirty-six groups of 50 undamaged seeds were selected, of which twenty-seven were pelleted using a methyl cellulose sticker and activated charcoal. Pots were pack-filled to 2 cm from the rim with a humic sandy loam alluvium. Each group of seeds was mixed into a given volume of red earth (selected on the basis of a high previous weed population, particularly crowsfoot grass), sufficient to bring the total level soil volume to 0.5 cm from the rim.

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A suspension of 'Atradex' (80% w/w atrazine) was prepared, 200 ml of which delivered the equivalent of 4.5 kg a.c. ha^{-1} of atrazine on the surface of a 24 cm pot. The remaining treatments were obtained by serial dilution of this suspension. Each suspension (200 ml) was distributed uniformly over the soil surface. Pots were maintained near field capacity during the experiment and fertilized weekly with a complete nutrient solution.

At 12 days, the proportion of kikuyu, grass weeds and broadleafed weeds visibly affected by the atrazine was noted. "Visible" effect was indicated by chlorosis and/or deformity. At 40 days, another population count was taken, and the material harvested for oven dry matter determination.

RESULTS

Atrazine effects

The main weed species present were:

Grasses: crowsfoot grass, summer grass (*Digitaria ciliaris*), giant paspalum (*Paspalum urvillei*);

Broadleafed weeds: turnip weed (*Rapistrum rugosum*), bitter cress (*Coronopus didymus*).

There were no significant differences between treatments in the number of kikuyu plants visibly affected at 12 days. However, both grass and broadleafed weeds showed significant differences at most levels of herbicide.

Figures 1 and 2 relate atrazine rate to population and yield of the various components at 40 days. These data are drawn from the pellet treatments only.

After 40 days, there was no significant effect of atrazine on kikuyu population, but weed populations, particularly broadleafed species, were significantly reduced.

Atrazine had large effects on yield of all groups. The initial depression in kikuyu yield was largely due to weed competition.

Pelleting effects

Charcoal pelleting had no significant effect on numbers of kikuyu seedlings. However, there was a significant improvement in yield due to pelleting at 1.3 kg a.c. ha^{-1}, but not at 2.7 kg a.c. ha^{-1}.

DISCUSSION

Atrazine is registered for selective weed control in maize and sorghum crops. The recommended pre-emergence application rate on a soil of the type used is about 2.5 kg a.c. ha^{-1} of atrazine (Swarbrick 1976). In this study, kikuyu was quite severely affected at that rate.

The relatively higher atrazine tolerance of kikuyu as compared to the range of weeds investigated indicates that atrazine might well have a place in commercial establishment of kikuyu pastures. This tolerance may be improved at low rates of atrazine by charcoal pelleting the kikuyu seed. However, field verification is necessary.

If the results of this experiment are compared with those of Hawton (1976) and Scattini (1978) it appears that kikuyu is more tolerant of atrazine than *Paspalum plicatulum* cv. Rodds Bay, *Setaria anceps* cv. Narok, *Chloris gayana* cv. Pioneer, *Panicum coloratum* var. *makarikariense* cv. Bambatsi and *Cenchrus ciliaris* cv. Biloela; but displays a tolerance less than or equal to *Bothriochloa insculpta* cv. Hatch, *Panicum maximum* cvv. Gatton and Petrie and *Brachiaria decumbens.*

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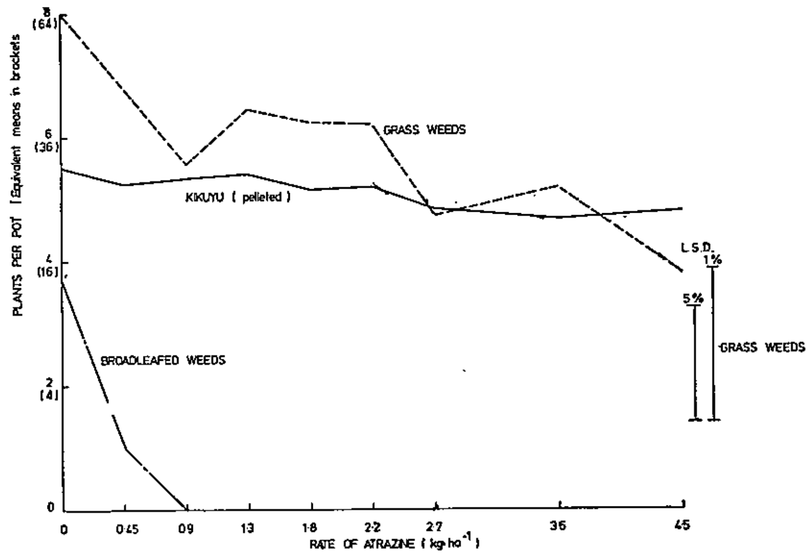

FIGURE 1

Relationship between rate of atrazine and number of plants per pot at 40 days (square root transformation).

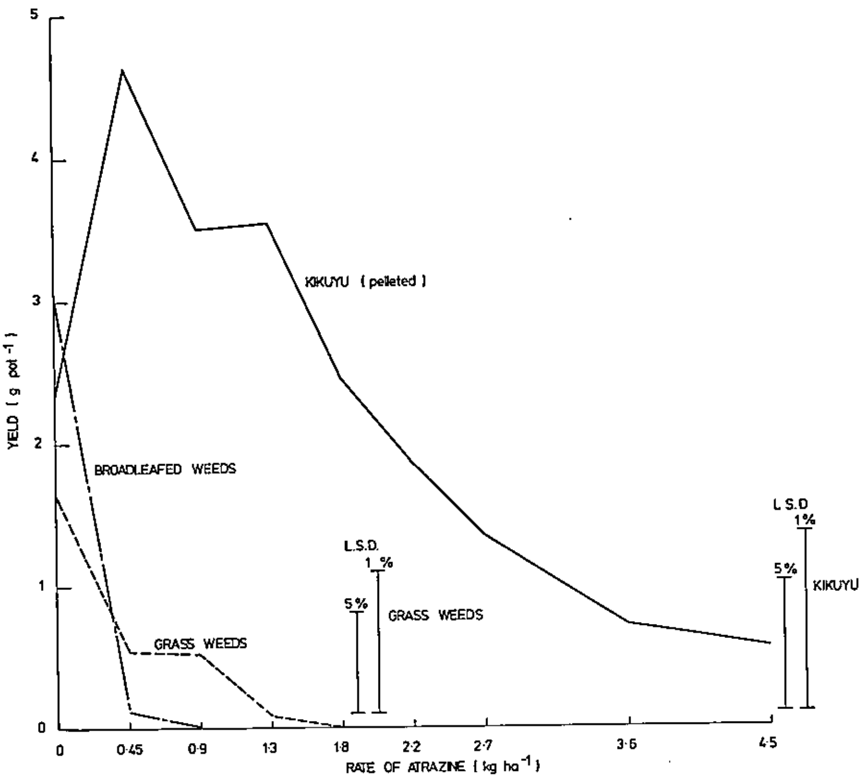

FIGURE 2

Relationship between rate of atrazine and yield (g oven dry matter) per pot at 40 days.

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