atrazine plus crop oil was inferior to that with the higher rate of atrazine alone. This was more marked in other field tests where *S. glauca* was absent and *E. crus-galli* the dominant species. Thus the aim in use of an adjuvant with atrazine should be to obtain better weed control rather than to attempt to lower the rate of atrazine.

TABLE 1

Mean Grass Control and Cob Weights, compared with Untreated Controls

Adjuvant	Atrazine 1.0 lb/ac		Atrazine 2.0 lb/ac	
	Grass Control	Cob Weights	Grass Control	Cob Weights
Nil	48.7%	103.2%	87.2%	93.3%
Crop Oil				
0.2 gal./ac	83.1%	94.7%	93.8%	97.4%
0.8 gal./ac.	75.4%	96.4%	89.7%	99.7%
2.2 gal./ac.	18.0%	94.0%	48.7%	95.3%
Surfactant				
0.2 gal./ac.	64.6%	79.8%	93.3%	84.2%
0.8 gal./ac.	38.0%	36.2%	70.8%	39.5%
2.2 gal./ac.	0%	11.5%	6.2%	6.9%

TOWARDS A SYSTEM OF LAND PREPARATION AND WEED CONTROL FOR AERIALLY SOWN RICE GROWN UNDER NATURAL RAINFALL IN NORTHERN AUSTRALIA

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In research into rice-growing methods on the subcoastal plains of northern Australia, the system receiving most attention involves aerially sowing rice into rainwater ponded in the fields.

The wet-season rainfall commences in October and increases each month, allowing ponding of rainfall to occur normally around the period mid December to late January.

At present, seedbed preparation is carried out using dry cultivation in December followed by puddling just prior to sowing.

Puddling is a slow and unsatisfactory operation which should be eliminated from the system if possible. To do this is the object of the present work.

The Weed Population

The weeds present can be conveniently divided into those that usually germinate before the soil is saturated and those that normally appear after that time.

The most important weeds in the first group are *Sesbania benthamiana*, *Echinochloa colonum*, *Echinochloa stagnina*, and *Oryza spontanea*.

In the second group, such species as *Cyperus iria*, *Cyperus difformis*, *Fimbristylis littoralis*, *Fimbristylis trachyearya*, *Fuirena ciliaris*, and *Eleocharis acicularis* are commonly found.

Experimental

In an attempt to prepare a seedbed for aerially sown rice without puddling, the use of herbicides both with and without dry cultivation has been tested.

In using herbicides with dry cultivations, the aim has been to use one or two disc harrowings, followed by an application of a herbicide. The time of cultivation is dictated by the pattern of early rainfall, but in most years, one cultivation in November and one around mid December should be possible.

These two cultivations reduce greatly the numbers of early-germinating weeds. Herbicides are used to eliminate the last of these and to control the late-germinating ones.

Several herbicides have been tried, the most successful being a 2,2-DPA-MCPA mixture at the rate of 8 lb a.i. per acre (9.0 kg per hectare) 2,2-DPA and 2 lb a.e. per acre (2.2 kg per hectare) MCPA.

Use of herbicides alone to prepare a weed-free seedbed is at an interesting stage.

When used in an attempt to eliminate all weeds from the start of the season, herbicides were not very successful. However, some recent work has introduced the possibility of using herbicides to alter the ecology of a field to the benefit of the farming regimen.

Paraquat at about 0.2 lb a.i. per acre (0.22 kg per hectare) applied in early November was found to control the early grassy weeds, but not the legume, *Sesbania benthamiana*. This then grew ahead and apparently suppressed further germination of the grassy weeds.

In mid January, the *S. benthamiana* was killed by applying MCPA at roughly 2 lb a.e. per acre (2.2 kg per hectare).

Three weeks later, rice was broadcast into ponded rainwater containing the now dead *S. benthamiana*. The rice was able to

utilize nitrogen from the decaying nodules of the legume, and only 18 lb per acre (20 kg per hectare) of nitrogen, as a top dressing, was applied.

Quadrat yields of about 3,000 kg per hectare paddy rice were obtained.

If this system can be made practicable on a large scale it represents a very cheap method of growing rice.

THE EFFECTS OF RATE AND TIME OF APPLICATION OF MOLINATE ON THE CONTROL OF *ECHINOCHLOA* SPP. IN RICE

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Molinate has been widely used for the control of *Echinochloa* spp. in rice in both the U.S.A. and Australia. In America it is recommended for pre-sowing applications for rice sown into water or post-emergence applications to drill-sown rice. Crop damage has been reported when molinate has been applied before sowing to drill-sown rice.

To investigate optimal application rates and times for rice under drill-sown conditions in New South Wales rice-growing areas, a series of trials were carried out in the Murrumbidgee Irrigation Area. These trials included molinate at rates ranging from 2 to 6 lb a.i. per acre (2.25 to 6.74 kg per hectare), applied at times ranging from before sowing to immediately prior to permanent flooding, up to 37 days after sowing. Herbicide volatilization was minimized by shallow cultivation, in the case of pre-sowing treatment, or by flooding within 24 hours of application.

Observations on *Echinochloa* population and growth indicated that molinate at rates of 3 lb a.i. per acre (3.37 kg per hectare) and above gave effective control. There was little difference between times of application. In one trial pre-sowing, pre-emergence, and early post-emergence applications (up to 16 days after sowing) were superior to late post-emergence applications (36 days after sowing). In other trials post-emergence applications up to 37 days after sowing were superior to pre-emergence applications. It appeared in these latter trials that 5 lb a.i. per acre (5.62 kg per hectare) applied before emergence gave a similar degree of weed control to