INTRODUCTION

Rice is the most important staple food of the East and South Asian countries including India. In India paddy is grown over 81343000 acres of land which accounts for 31 per cent of the total land under cultivation in the country. Out of the total annual production of food grains in India, paddy accounts for 40.9 per cent. Depending upon the method of cultivation, there are two main types of paddy crops. In the state of West Bengal (India) where the experiments have been conducted, the most widely grown crop is the low-land or transplanted paddy. The upland or drilled paddy covers about sixteen per cent of the total area under paddy in the state and is grown over the high lying fields having no irrigation facilities.

The upland paddy crop remains highly infested with grassy weeds. The dominant species in this locality include Panicum humilae, Paspalum scrobiculatum, Setaria glauca, Eleusine indica, Echinochloa colonum, Cyperus iria, Cyperus compressus and Cyperus rotundus. These weeds compete severely with the crop. The problem is not so grave for low-land paddy where practices like puddling the soil and keeping few inches of water standing in the field throughout the growth period of the crop keep most of the weeds under check. The upland fields on the other hand provide favourable conditions for weed growth. This tract where the experiments have been conducted has lateritic soil which is sandy loam in nature.

The most prevalent method of weed control in this part of the country is to remove them by manual labour, using a hand tool called 'Khurpi'. Use of country plough in some localities, to thin the crop, also helps in removal of some weeds. But these methods of weed control are not effective as they need large amount of manual labour which, generally is in short supply during the time when weeding is required. In the fields where paddy is drilled in lines, mechanical cultivators can be used, but they also are not satisfactory as they do not destroy the weeds near the crop plants, which grow more luxuriantly after cultivation. The use of mechanical cultivators and flame weeders is further limited by the close spacing of rows of crops.

Under these circumstances, the control of weeds by chemical weed killers is the only possible practice that might be considered

seriously. The use of growth regulators for weed control in transplanted paddy has been successfully tried in many places, but adequate information is lacking regarding their use in upland paddy. As the weeds reduce the crop yields drastically, and weed control is known to be an effective practice in increasing the crop yield, the use of growth regulators under the experiments reported in this thesis was undertaken, with a view to find out their efficacy in combating the grassy weeds in upland paddy in laterite soils. In justification of the choice of hormone weed killers for weed control, it may be relevant to quote an interesting observation by Tuckey (1954). He states, 'hormone herbicides are so different from other chemicals as to represent a truly new era in weed control of great economic significance'. The need for the trials of hormone weed killers in this locality can best be justified by quoting from Lee Ling (1952). He writes, 'they operate differently in different situations depending on the kinds of weeds and crops'. He further states, 'in view of the wide variation in environmental conditions and farming practices in different parts of the world as well as the great variety of the crop and weed plants involved, the control of weeds is a local problem'.

The present work embodies the results of five experiments. In the first experiment the competing ability of five crops with associated weeds was studied and the loss due to weed infestation was estimated by growing the crops both under weedy and weedfree conditions. In the second experiment the effect of delayed seeding in crop season has been studied. The aim of the experiment has been to study the effect on weeds which appear with the onset of monsoon, get eliminated while the seedbed is prepared and to assess, in turn, the effect on growth, development and yield of crop.

Though trichloroacetic acid and isopropylphenyl carbamate have been successfully used as weedkillers to control grassy weeds, the upland paddy crop under study being a monocot, Sod.2,4-D (Sodium 2,4-dichlorophenoxyacetic acid) and Sod. MCPA (Sodium-2-methyl-4-chlorophenoxyacetic acid) have been tried as pre and post-emergence sprays to control the weeds growing in association with this crop.

Since the time of application and the concentrations are important factors affecting the crop and associated weeds, the third experiment is planned to study the effect of sod.2,4-D and sod.MCPA used as post-emergence sprays on crop and weeds in paddy field. However, in the

fourth experiment, only sod.2,4-D was applied as a pre-sowing treatment. This experiment was conducted to find out a suitable dose of chemical to kill all the weeds in paddy field and further to find a suitable interval between application of the chemical in the soil and seeding of the crop so as to avoid the toxic effect of the chemical on the crop.

Mitchell and Marth (1947) have made the observation that, the toxicity gets affected in moist soils and may be changed to inactive form due to factors like temperature, organic matter content and pH of the soil. In addition to the effective control of weeds, the success of pre-sowing treatment lies in the timely sowing of the crop. Upland paddy responds best when sown with the commencement of the rains. But the chemical applied as pre-sowing treatment proves effective only after the land gets the first showers, hence, any attempt towards reducing the active toxicity of the chemical after the first rainfall will aim at proving that the pre-sowing land treatment with the chemical is successful in controlling grassy weeds. With this point in view, the fifth experiment was conducted to study whether the organic matter content of the soil has any effect in reducing the period of toxicity of the chemical in the soil.

Experiments 1 and 2 were conducted for two years each during 1958-60 and 1959-61, respectively while Experiment 3 was conducted for three years (1958-61). Experiment 4 was conducted for two years (1959-61) and Experiment 5 was conducted for one year (1960-61). The various items of subject matter have been arranged by chapters. The chapters, Review of Literature, Experimental Procedure and Experimental Results and Discussion have been divided into two sections - section A dealing with experiments 1 and 2 and section B dealing with experiments 3, 4 and 5.

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