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Weed Control by Chemical Herbicides

IV. Control of Kikuyu grass (*Pennisetum clandestinum* Hochst) by means of herbicide chemicals.

by

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Introduction: Kikuyu grass is a native of tropical Africa, which was first tried at the Central Farm, Coimbatore in 1924. A perennial grass of the runner type, this grass has now got established in the Nilgiris, Kodaikanal and Anamallais areas. Although at the Central Farm it was found not suitable for periodical cuttings like Guinea grass or Napier grass, on the hills, it is an excellent pasture grass and soil-binder, able to withstand both frost and water-logging. But its very virtues have made it one of the most aggressive and noxious weeds of hilly areas, especially when it grows on the bunds of cultivated fields as on the Nilgiris in potato fields; in the same way as two other imported ornamental plants, *Lantana camara* and Water hyacinth have become pernicious weeds on the plains. This paper presents the results of a preliminary trial that was carried out at the Agricultural Research Station, Nanjanad against Kikuyu grass, as the results seem sufficiently clear-cut to warrant publication.

Although chemical herbicides are found quite effective against those of the broad-leaved dicot weeds, the control of grassy weeds still remains a problem and the control of Kikuyu grass is perhaps one of the most difficult of these, on account of its aggressive spreading habit and the presence of soft, velvety hairs on the leaves. Amongst the numerous chemicals that are suggested by various workers against grassy weeds, TCA (Trichlor-acetic acid) has pride of place, as for example against quack grass *(Agropyron repens)* (Carder (2)), against nutgrass, *Cyperus*, Sp. (Orseings and Smith, (6)). CMU (3-p chlorophenyl 1, 1-dimethyl urea) is another chemical that is widely used in controlling grassy weeds - vide McCall (5) and other workers elsewhere. Application of CMU at 20 lb. per acre and higher doses, controlled many grasses as well as broad-leaved weeds by acting through the roots of stems. Lachman (4) reports that the grasses could be effectively controlled by CMU, with dosages of 2, 4 and 8 lb. per acre. Presenting the effects of CMU on couch grass, Knowles (3) claims that the chemical can give practically complete eradication of the grass. Another herbicide that is gaining favour

in recent years in Dalapon (2, 2-dichloropropionic acid). Thus it is reported by Alley and Bohmont (1) that application of Dalapon at rates varying from 3 to 20 lb. per acre gave good control of both grassy weeds and broadleaved weeds in sugar beets.

Experiment: In the light of these results and reports, a trial was laid out at the Agricultural Research Station, Nanjanad to see how far, TCA, CMU and Dalapon could control Kikuyu grass, the most persistent perennial weed of the locality. An uncultivated patch of land thickly matted with Kikuyu grass was chosen for the layout of the trial. The five treatments viz., (1) control (no spray) (2) TCA at 100 lb/acre (3) Dalapon at 16 lb. per acre (4) CMU at 16 lb. per acre and (5) a combination of Dalapon and CMU at 16 lb. each per acre, were replicated six times. The application of all the three chemicals was done in the form of an aqueous spray, on 9—9—1958, using a spray volume of 100 gallons per acre for all treatments.

From the date of spraying, reguiar observations were recorded for a period of 15 weeks and the efficiency of the chemicals is assessed in the observations given below. In view of the dense growth of the grass, it was not poossible to make any quantitative assessment of mortality by the usual method of taking counts of plants destroyed by the herbicides in quadrats taken at random in the plots, before and after spray treatment. The detailed observations were continued for a period of 15 weeks, after which further observations were recorded in December, 1958 and in March, 1959.

Treatment No. 1: *(Unsprayed control)* The control plots remained quite green and densely matted with the grass, with frequent new growths after periodic showers. In March, 1959, also, these plots remained uniformly green and covered with a thick mat of grass.

Treatment No. 2: *(TCA)* Within two hours of spraying the chemical, the leaves of the grass showed scorching at the tips and margins and thereafter the drying-up continued till the plots looked bone-dry at the end of 20 days after spraying. It was also observed that a few patches of grass, that had received lesser quantities of the spray material, also turned brown and dry after ten days and and eventually dried up completely in about a month. Thereafter, the plots remained quite dry, with no regrowth whatsover, for the rest of the observational period until the end of December, 1958, i. e.,

for a period of 16 weeks. When these plots were inspected once again in the last week of March, 1959, when nearly 28 weeks had elapsed after the weedicide spray, a few small green tufts of new grass were noticeable.

Treatment No. 3: *(Dalapon):* Scorching and leaf-drying commenced on the third day after spraying and the drying up continued for nearly 1½ months, at the end of which the plots assumed a completely dry appearance. Here too, stray patches that had received lesser spray material dried up subsequently. Two months after spraying however, isolated patches were seen to rejuvenate, though the re-growths were very slow and feeble. At the end of the observation period, the plots were found dry for the most part, barring a few small patches of green regrowths here and there. Twenty-eight weeks later, the dry grass was seen to be sparsely intermingled with green grass.

Treatment No. 4: *(CMU):* Leaf-drying commenced three days after spray treatment in isolated patches and at the end of two weeks, the plots had a half-dry-half-green appearance which lasted unchanged throughout the observation period. By March 25th, 1959 these plots showed a fair growth of new grass.

Treatment No. 5: *(CMU and Dalapon):* Drying of the leaves commenced three days after spraying and the plots turned completely dry in about a month's time. This continued practically till the end of the observation period, although three or four small tufts of green regrowths could be seen scattered in the plots about two months after sprying. Seven months after spraying i. e., in March, 1959, these plots showed a moderate growth of fresh grass intermingled with the old dry grass.

Discussion: The results idicate that TCA is the most effective amongst the three herbicides tried. Its scorching effect was discernible even within a few hours after spraying and no regrowth of any kind occurred throughout a period of 105 days. That the herbicide kills the grass through the roots was evident by the fact that even the patches which were not covered by the spray material directly, were acted upon subsequently, resulting in a uniform drying-up of grass. Its efficiency in controlling Kikuyu grass is further underlined by the fact that there was no rejuvenation of grass at all for a period of 16 weeks after spraying and even seven months, with sprayed plots showed only very small tufts of regrowths.

When used as a pre-emergence spray, prior to the emergence of planted potatoes, the recommended dosage of TCA is 8 - 10 pounds per acre (Shaw 1954), but in the present trial, the growth of Kikuyu grass was so rank and dense that a heavy dosage of 100 lb. was tried, although from the results observed it seems likely that this dosage can well be reduced to about 20 or 25 lb. per acre without loss of efficacy in controlling the grass. This would obviously be the direction in which further trials and study would be programmed.

Dalapon was also nearly as effective as TCA, and although its effect on the grass is not quite as rapid as that of TCA, the final effect of both these weedicides is almost the same except that with Dalapona few cases of rejuvenation occured about two months after spray treatment.

CMU has not proved itself to be very effective at the concentration used. But the observations indicate that a higher concentration might prove more useful.

A mixture of Dalapon and CMU has also proved equally effective in controlling Kikuyu grass, as shown by the observations.

At the dosages tried, the cost of eradication will be about Rs. 100/- per acre, for TCA, Rs. 70/- for Dalapon and as much as Rs. 200/- per acre if CMU is used. Hence the scope for further study would be in the direction of finding out the minimum effective dose for TCA and Dalapon. It is observed that the total chemical required for effective control by two divided sprays is less than what would be needed to secure the same effect by a single spray (Southwick, 1957), hence this aspect also needs careful study in future trials. It seems very probable however, that with a few more trials on the lines suggested above the problem of controlling this aggressive weed on the Nilgiris could be solved without great difficulty.

Summary and Conclusions :

1. TCA at 100 lb., Dalapon at 16 lb., CMU at 10 lb. and a combination of Dalapon and CMU at 16 lb. each per acre, were tried separately for eradication of Kikuyu grass (Pennisetum clandestinum) at the Agricultural Research Station, Nanjanad.

2. TCA has given the best result in that complete drying up of the grass could be achieved by spraying this chemical.

3. Dalapon ranks next to TCA in its efficiency in controlling the grass.

4. There are indications that a higher concentration of CMU might prove more effective and also that a lower dosage TCA would be sufficient to control Kikuyu grass on the Nilgiris.

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Cultivation of Irrigated Summer Cambodia and Suggestions for Improvement

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Introduction : With the commencement of summer i. e. February –March, what corresponds to the *Masipattam* in the Tamil agricultural calender, large areas - about 74,000 acres - are cultivated annually, with an American variety of cotton, popularly known as Uganda or Rajapalayam - *G. hirsutum*. The districts concerned are Ramanathapuram, Tirunelveli and parts of South Arcot in the order of importance. The strain that is recommended for this zone of growth by the Agriculture Department is called MCU. 2 (Madras Cambodia Uganda - 2). It is one of the best quality long staple cottons in India. Though this strain has almost covered the entire area, the method of cultivation varies from place to place giving scope for improvement. In this brief article the average cultivation cost and