https://doi.org/10.29321/MAJ.10.A03783

# Eradication of Nutgrass by killing the Tubers with 2, 4-D*

*by*

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**Synopsis:** The results of a trial conducted at the Bihar Agricultural College, Sabour (Bhagalpur) during 1960—'61 with Fernoxone (80 per cent sodium salt of 2, 4-D) to kill nutgrass weed are reported in this paper. Low dose of Fernoxone at 2 lb a. e. per acre was not effective in killing the nut grass tubers while higher dose at the rate of 4 lb a. e. per acre applied twice was found effective in killing nutgrass tubers upto a depth of eight inches in fallow land.

**Introduction:** Nutgrass (*Cyperus rotundus* L) weed is a great nuisance in cultivated fields. It is a perennial weed and reproduced vegetatively by tubers which grow in chains on rhizomes which are connected to basal bulb. In heavily infested field, the chains are found throughout the field in the first foot of soil though some times nuts have been found upto 30 inches depth. Hence it cannot be easily controlled by the usual methods of ploughing, harrowing and inter-cultivation. The use of growth-regulating chemicals as weed-killers has become common in progressive countries and a number of commercial preparations of these are now available in various forms. While broad-leaved dicot weeds can be effectively controlled with the chemical herbicides, nutgrass is very difficult to be checked on account of the aggressive spreading habit and the presence of sub-terranean tubers with a number of buds which are capable of remaining dormant for a long period.

**Review of Literature:** Recent experiments with synthetic hormonal herbicides have shown that nutgrass can be controlled by a judicious application of certain herbicides. Among the various chemicals tried, 2, 4-D and MCPA have been found to reduce nutgrass stand considerably.

Stamper and Melville (1956) reported that application of three pounds per acre of any formulation of 2, 4-D killed tubers actually growing at the time of application, but did not affect dormant tubers. Loustalot *et al* (1954) found that even repeated treatment of shoots with 2, 4–D over a long period of fallow only reduced and did not eradicate the tubers. In India Krishna Rao *et al.* (1951) found that two or three sprayings with Fernoxone (80 per cent sodium salt of 2, 4-D) of 0·2 and 0·5 per cent concentration in dry land during fallow period killed 90 per cent of the bulbs and suppressed germination of second and third bulbs lower down to some extent. Thakur and Singh (1954) found Fernoxone a quicker acting and more effective herbicide for killing nutgrass. Arakeri (1957) reported

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* The work was carried out at Bihar Agricultural College, Sabour, Bhagalpur by the first author under the supervision of the second author for obtaining the Ph. D. degree.

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Received on 23—1—1965.

that the sodium salt of 2, 4-D controlled the superficial growth and killed about 50 per cent of the nuts that had not established aerial connections at the time of spraying. Narayanan (1954) reported that a mixture of 2, 4-D and MCPA in the form of sodium salts sprayed at the rate of five pounds in 50 gallons per acre gave 90 to 100 per cent mortality in nutgrass in the course of three to four weeks from spraying date and regrowth was prevented for a period of nearly three months. Narayanan and Meenakshisundram (1957) also reported similar results.

**Materials and Methods:** Trials were conducted at the Bihar Agricultural College, Sabour (Bhagalpur) during the period of 1960 to 1963 with Fernoxone (80 per cent sodium salt of 2, 4-D) to kill nutgrass. To make the weedicide more effective, the field was deep cultivated in the summer months of April. No crop was grown during the period of experimentation.

There were seven treatments which were repeated four times. The treatments were: $T_0$ (no spraying of weedicide), $T_1:_1$ (one spraying of Fernoxone at the rate of 2 lb a. e. per acre), $T_1:_2$ (two sprayings of Fernoxone at the rate of 2 lb a. e. per acre) $T_1:_3$ (two spraying of Fernoxone at the rate of 2 lb a. e. per acre and one cultivation before a week of second spraying), $T_2:_1$ (one spraying of Fernoxone at the rate of 4 lb a. e. per acre), $T_2:_2$ (two spraying of Fernoxone at the rate of 4 lb a. e. per acre) and $T_2:_3$ (two sprayings of Fernoxone at the rate of 4 lb a. e. per acre and one cultivation before a week of second spraying). The size of each plot was 24·2′×18·0′ or 1/100th acre.

Spraying was given on the 10th July and 20th August. Nutgrass tubers were counted upto eight inches depth of soil in two 2′×2′ quadrates at random on (i) one day before first spraying, (ii) one month after first spraying, and (iii) one month after second spraying.

**Results and Discussion:** The population count of nutgrass tubers taken after first spraying of the weedicide was statistically analysed with co-variance technique. The effect of differences in the initial number of tubers (before spray) was eliminated by the analysis of co-variance technique. The unadjusted and mean number of nutgrass tubers are presented in Table I.

TABLE I

*Unadjusted and adjusted mean number of nutgrass tubers.*

| Treatments | Unadjusted | Adjusted |
|---|---|---|
| $T_0$ – No spraying | 160·25 | 162·41 |
| $T_1$ – One spraying | 151·75 | 152·79 |
| $T_2$ – Two spraying | 118·75 | 117·49 |

At this stage there were only three treatments: $T_0$ (control), $T_1$ (spraying with 2 lb per acre) and $T_2$ (spraying with 4 lb per acre). The treatment differences were not significant.

The population count of tubers taken after second spraying was statistically analysed. The unadjusted and adjusted mean number of tubers are presented in Table II. The results obtained were due to the cumulative effect of the first and the second spraying of weedicide.

TABLE II

| Treatments | Unadjusted | Adjusted |
|---|---|---|
| $T_0$ | 217·75 | 223·83 |
| $T_1:_1$ | 213 00 | 210 07 |
| $T_1:_2$ | 203·50 | 212·11 |
| $T_1:_3$ | 148·00 | 151·23 |
| $T_2:_1$ | 130·25 | 128·95 |
| $T_2:_2$ | 93·75 | 77·53 |
| $T_2:_3$ | 83·00 | 79·27 |

C. D. at 5% = 16·62.

| $T_2:_2$ | $T_2:_3$ | $T_2:_1$ | $T_1:_3$ | $T_1:_1$ | $T_1:_2$ | $T_0$ |
|---|---|---|---|---|---|---|
| 77·53 | 79·29 | 128·95 | 151·23 | 210·07 | 212·11 | 223·83 |

An examination of the adjusted mean number of tubers (Table II) revealed that the level of weedicide had been the dominating factor in reducing the number of tubers. Among three levels of weedicides, $T_2$ group of treatments had been significantly superior over $T_1$ group of treatments and $T_0$. The same was not the case between $T_1$ group and $T_0$.

Among the $T_2$ group, the least adjusted mean number of tubers (77·53) had been due to $T_2:_2$ followed closely by $T_2:_3$ (79·29), there being no significant difference between these two. These two treatments had been observed to be significantly superior over $T_2:_1$ (128·95).

$T_1:_3$ (151·23) had been observed to be significantly superior to $T_1:_1$ (210·07) and $T_1:_2$ (212·11) and also to $T_0$ (223·83). The latter three treatments did not reduce the tuber population significantly over each other.

It is seen from the results that the application of Fernoxone (80 per cent sodium salt of 2, 4-D) at the rate of two lb a. e. per acre was not effective in reducing the tuber population even when applied twice though it was effective in controlling the aerial parts of nutgrass. The application of weedicide at the rate of two lb per acre twice with a cultivation before second spraying was found to be superior to the treatment in which no cultivation was given. It was equally good to the treatment in which one spraying was given with four lb a. e. per acre rate. The application of weedicide at the rate of four lb twice gave better control than the two applications of two lb dose. The maximum control of nutgrass tubers was achieved with two applications of the weedicide at the rate of four lb per acre, closely followed by the treatment in which light cultivation was given before one

week of second spraying. The partial control of tubers with single application of weedicide at the rate of four lb per acre was due to the killing of only actually growing tubers at the time of application of weedicide leaving the dormant tubers unaffected. The reason for Fernoxone being more effective when applied after cultivation (in $T_1$ : $_3$) appears to be due to the translocation of the weedicide to a greater depth caused by cultivation.

**Summary:** For complete eradication of nutgrass weed (*Cyperus rotundus* L.), the death of all the subterranean tubers is essential. It has been reported by some workers that tubers can be killed by repeated spraying of Fernoxone. A trial was conducted at Bihar Agricultural College, Sabour (Bhagalpur) to find out the dose, the time of application and the effect of preceeding cultivation for killing nutgrass weed.

Chemical control of nutgrass with Fernoxone was found to be the most effective proposition. Low dose of Fernoxone (two lb a. e. per acre) was not effective in killing the nutgrass tubers. High dose of Fernoxone at the rate of four lb a. e. per acre applied twice was found to be very effective in killing nutgrass tubers upto a depth of eight inches in fallow land.

**Acknowledgement:** The authors are gratefully indebted to Sri R. S. Roy, Principal and Regional Director, Bihar Agricultural College and Regional Research Institute, Sabour for his constant encouragement and extending full facilities in various forms during the course of the experimentation.

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