

Relationship between moisture levels and viability of nutgrass tubers

by

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Synopsis: The relationship between moisture content and viability of nutgrass tubers has been studied. The tubers require a minimum of 11.84% moisture, to show any viability.

Introduction: Nutgrass (*Cyperus rotundus* Linn.) has most of the tubers spread in the upper six inches, very few going deeper. The fresh tubers contain 50% moisture (by weight), which appears to be an important factor for retaining the viability of the tubers. The present investigation was planned to establish a relationship between moisture levels of the nutgrass tubers and their relative viability.

Krishna Rao and Moses (1949) in their preliminary study of the effect of summer ploughing on the germination of nutgrass, have stated that deep ploughing in summer and subsequent exposure of tubers to sun for a period of fortyfive days without rain, is effective in killing *Cyperus* bulbs. Nambiar (1944) has reviewed the various methods of eradication of nutgrass. Smith and Mayton (1939) suggested that frequent cultivation and rotation resulted in some control of nutgrass. Davis and Hawkins (1943) recorded that deep tillage and irrigation once a month gave good control over the weed. Andrews (1940a) and Burns (1922) in their studies with the species concluded that seeds are of lesser importance in the propagation and perpetuation of the weed and tuber alone should be killed. Andrews (1940b) again has shown that the tubers in soil are able to survive in the dry season with deep root system which can tap the subsoil, and control can be effected by cutting this root system below the depth of the lowest tuber and allowing the severed tubers to remain in the soil, atleast a month.

Material and Methods: Required quantity of nutgrass tubers of uniform size was collected within six inches of soil depth. Tubers in sets of hundred were dried for 0, 12, 24, 36, 48, 60, 72, 84 and 96 hours respectively in open sunlight. Weighings were taken before and after drying (every 12 hours) with a view to determine the relative moisture content in the tubers. After the above periods of exposure to sunlight the tubers

* Received on 11-7-1962

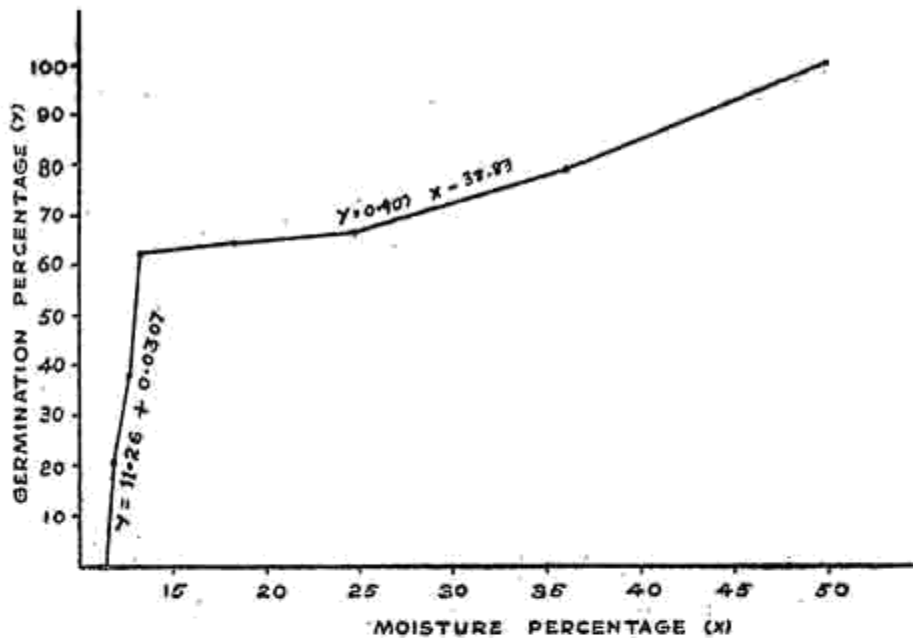
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were tested for their germination in pots. The germination in each treatment was noted. Each period of drying included an additional exposure of 12 hours to air in the night at room temperature, during which period the moisture loss was negligible. The minimum moisture required for germination was determined.

Results and Discussion: Data showed that sun drying of tubers did reduce their germination capacity as explained by earlier workers, who have not stated sufficient reasons for the decline in germination after drying. The freshly collected tubers had a maximum of 50% moisture (by weight) in them and when sufficiently mature, gave cent per cent germination. Subsequent drying naturally relieved the tubers of some amount of moisture, the rate of reduction being more in the first few days of drying, than in the subsequent days. The data relating to the study are presented in the accompanying table and graph, which aim at a relationship between the moisture content and the viability of tubers. When the moisture content was reduced to 11.84% the germination was only 21 per cent. Further reduction in moisture to 11.48% resulted in no germination. The interesting feature was that when moisture level was 13.07% the germination was as high as 62 per cent. A reduction in moisture by 0.46%, 1.23% and 1.59% resulted in 38%, 21% and 0% germination respectively. The above critical moisture zones conditioned the viability of tubers. Oven drying of the tubers caused a complete kill and eliminated moisture thoroughly, resulting in no germination.

Duration of sun drying (No. of hours)	Wt. of 100 tubers (in gms.)	Moisture % in 100 tubers (Wt. basis)	Germination percentage
0	79.44	50.00 (fresh)	100
12	68.39	36.01	79
24	59.67	24.99	66
36	54.32	18.38	64
48	50.10	13.07	62
60	49.73	12.61	38
72	48.93	11.84	21
84	48.84	11.48	0
96	48.40	11.01	0
Oven drying	39.72	0	0

GRAPH SHOWING THE CORRELATION BETWEEN MOISTURE CONTENT AND GERMINATION



From the data presented in the table it is seen that there is a close relationship between the moisture content of tubers and germination percentage. There exist two patterns of correlation viz., 0 to 13.07% and 13.07% to 50.00% moisture. The statistical analysis of the data also confirmed the view in both the cases since the correlation coefficients are as high as 0.973 and 0.971 respectively which are significant even at 0.01 level.

S. No.	Particulars	Correlation coefficient	Regression equation
1	Germination percentage (Y) Moisture percentage (X) (0 to 13.07 range)	0.973**	$Y = 11.26 + 0.0307 X$
2	Do Moisture percentage (X) (13.07 to 50.00 range)	0.971**	$Y = 0.907 X - 37.83$

** Significant at 0.01 level.

Disking, ploughing or digging with crowbar have been in practice for long, for getting rid of weeds such as nutgrass and *hariyali* (*Cynodon dactylon* Pers). The present investigation has brought out the possibility of

a few diskings or ploughings within top six inches resulting in drying up of tubers and bringing down the bound-water content. If there is no moisture available through irrigation or rain, the moisture content will be reduced to below 11.48%, which will cause the tubers to be non-viable. Once the moisture content is reduced below 11.48% even if water was made available the tubers were not able to recover, suggesting that this percentage of bound water, conditions the germination of tubers. Under field conditions it may take a longer time to relieve the moisture since the tubers will not be exposed fully to sunlight.

Summary and Conclusions: The effect of sundrying on the viability of nutgrass tubers was studied. There appears to be a definite relationship between the moisture content and viability of tubers. The tubers required a minimum of 11.84% moisture in them to show any germination. The study suggests a method for controlling and eradicating nutgrass by exposing the tubers to sundrying by suitable mechanical methods.

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