

UGC MAJOR RESEARCH PROJECT

FINAL REPORT

DROUGHT TOLERANCE AND ADAPTATION MECHANISM IN *Paspalum scrobiculatum* L. LAND RACES OF TAMIL NADU

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UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

PERFORMA FOR FINAL REPORT OF THE WORK DONE ON THE PROJECT

1. TITLE OF THE PROJECT: **DROUGHT TOLERANCE AND ADAPTATION
MECHANISM IN *Paspalum scrobiculatum* L.
LAND RACES OF TAMIL NADU**

2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR:

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3. NAME AND ADDRESS OF THE INSTITUTION:

Department of Botany
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4. UGC APPROVAL LETTER NO. AND DATE:

F.No. 42-957/2013 (SR) Dated: 22.03.2013

UGC EXTENSION LETTER NO. AND DATE:

F.No. 42-957/2013 (SR) Dated: 25.03.2016

5. DATE OF IMPLEMENTATION: 22.03.2013

6. TENURE OF THE PROJECT: 01.04.2013 to 31.03.2017

7. TOTAL GRANT ALLOTTED : Rs. 10, 24,800.00/-

8. TOTAL GRANT RECEIVED

1st Instalment : Rs.6,25,800.00/-

2nd Instalment : Rs.3, 19, 200.00/-

9. FINAL EXPENDITURE : Rs. 9, 44,670.12/-

10. TITLE OF THE PROJECT : **DROUGHT TOLERANCE AND ADAPTATION
MECHANISM IN *Paspalum scrobiculatum* L.
LAND RACES OF TAMIL NADU**

11. OBJECTIVES OF THE PROJECTS

1. To understand the effect of drought stress on growth and yield of *Paspalum scrobiculatum*.
2. To analyze the variation in biochemical constituents like protein, amino acid, proline, glycine betaine, starch, total sugar and sucrose under drought condition.
3. To understand the protein metabolism and proline metabolizing enzymes like γ -glutamyl kinase and proline oxidase under drought condition.
4. To understand the effect of drought stress on leaf and root anatomy of *Paspalum scrobiculatum*.
5. To analyze antioxidant metabolism under drought stress in *Paspalum scrobiculatum*
6. To analyze the effect of drought stress on Iso-enzymes through PAGE technique.

12. WHETHER OBJECTIVES WERE ACHIEVED (GIVE DETAILS)

The major objective of the project is to get to know the influence of drought stress on the growth and the productive of *Paspalum scrobiculatum*. Also, to determine the variation in biochemical constituents under drought condition. The project also helps in getting to know the protein metabolism and proline metabolising enzymes when crops are put under drought conditions the changes in Leaf and Root anatomy of crop can be studied when crops are put under drought stress exposure. The objective widens in analysing the effect of drought stress on antioxidant metabolism and Iso-enzymes from PAGE techniques.

13. ACHIEVEMENTS FROM THE PROJECT

Enhancement of productivity and profitability of crops can be established. The results of the project of helps in recommending the crops to be including Public Distribution system. Alternate methods for cultivation during unstable monsoon conditions is determined. Usage of resources like land done to the maximum even during altered climatic conditions. Anatomical study in made which brings about a conclusion that root, leaf and cell size in decreased under drought stress. Through analyses of various species of *Paspalum scrobiculatum* the project finds in establishing the results that *Paspalum scrobiculatum* shows better tolerance capacity when it is exposed to drought condition.

14. SUMMARY OF THE FINDINGS

In all varieties of *Paspalum scrobiculatum* the root length increased while shoot length, fresh weight and dry weight, yield parameters, pigments contents, protein and starch decreased under drought stress. The mineral content, calcium and potassium shows a decreased trend under drought stress. However, amino acid, total sugar, sucrose, proline and glycine betaine contents increased, whereas, proline oxidase activities decreased under drought stress condition. The activities of γ -Glutamyl kinase, proline oxidase, and non-enzymatic and enzymatic antioxidants like α -Tocopherol, Ascorbic acid, Reduced glutathione, Peroxidase, SOD, Catalase and Ascorbate peroxidase significantly increased under drought stress. Isoenzyme activities SOD, CAT, POX, APX significantly increased under drought stress. The anatomical study of root and leaf cells and size in decreased under drought stress in all varieties *Paspalum scrobiculatum* studied.

All the varieties of *Paspalum scrobiculatum* showed an inhibited growth and altered biochemical and enzymatic activities under drought conditions. Among the all varieties

studied, *Paspalum scrobiculatum* showed better drought tolerance capacity followed by PS9, PS13, PS6 and PS2 under pot culture.

15. CONTRIBUTION TO THE SOCIETY

Millets need very little water for their cultivation need no irrigation and do not burden the state with demand for irrigation power and subsidies for fertilizers. They are adapted to a wide range of ecological conditions, can grow on skeletal soil that are less than 15 cm deep. It does not demand rich soil for its survival and growth millet production is not dependent on the use of synthetic fertilizers. It is grown under the traditional methods, no millets attracts any pest, they can be termed as pest free crops. Millets are amazing in their nutrition contents. All these qualities of millet farming system make them the climate change compliant crops.

In Tamilnadu, mainly in the Cauvery delta districts (Nagapattinam, Thanjavur, Tiruvarur, Tiruchirapalli, Pudukottai and same part of Cuddalore) farm cultivation depends on Cauvery river irrigation. In these areas the farmers cultivate three time in a year and mostly paddy crop cultivated by farmers. If the monsoon fails, the whole system of cultivation altered that even for one time per year becomes so difficult. In these situation the farmers have to change the crop cultivation from paddy to millets.

The millets cultivation in these delta districts would make of economic changes. The land will be put up in cultivation and the farm workers are kept engaged. The state will not be put in pressure for the need of irrigative water, power and fertilizer subsidy while single crops such as rice and wheat can succeed in producing food security, the millets producer multiple securities. They include securities of food, nutrition, fodder, fibre, health livelihood and ecology when the production of millet is increased millets may be added into the Public Distribution System. The Indian PDS will be enriched with the high nutritive quality of the millets.

16. WHETHER ANY Ph.D. ENROLLED/PRODUCED OUT OF THE PROJECT

Yes. Ph. D Enrolled

Roll No : 1419030004

Candidate Name : Mr. G. Marimuthu, project fellow on 31.03.2017

17. NO. OF PUBLICATIONS OUT OF THE PROJECT

1. Mir Aafaq Ahmad, P.V. Murali, and G. Marimuthu “Alterations in Antioxidant Metabolism and Growth in *Paspalum scrobiculatum* L. Varieties Subjected to Drought Stress’ Int J Pharm Bio Sci 2014 Jan; 5(1): 1117-1131
2. P.V. Murali and .G. Marimuthu ‘ Drought stress induced Alterations in Compatible Solute accumulation and yield of six *Paspalum scrobiculatum* L. Land Races of Tamil Nadu. IJASART-Volume 3 Issue 5 May 2017
3. Marimuthu. G and P. V. Murali ‘Effect of drought stress in *Paspalum scrobiculatum* L. biochemical and compatible solute accumulation’ IJSRST Volume 4 Issue 2 ISSN 23956011 pp 618-622