

**FINAL REPORT OF THE WORK DONE ON THE
MAJOR RESEARCH PROJECT**

(From 01-04-2013 to 31-03-2017)

Reference No. & Date. F.No: 42-958/2013 (SR) dated 14.03.2013

**TRIAZOLE INDUCED DROUGHT STRESS AMELIORATION IN
ZEA MAYS L. (MAIZE)**

Submitted to



ज्ञान - विज्ञानं विमुक्तये

**UNIVERSITY GRANTS COMMISSION
BHADURSHAH ZAFAR MARG
NEW DELHI- 110 002**

Submitted by

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Assistant Professor
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**DEPARTMENT OF BOTANY
[UGC-SAP & DST-FIST SPONSORED DEPARTMENT]**



**ANNAMALAI UNIVERSITY
ANNAMALAI NAGAR-608 002
TAMIL NADU**

UGC MAJOR RESEARCH PROJECT

FINAL REPORT

**TRIAZOLE INDUCED DROUGHT STRESS AMELIORATION IN *ZEA MAYS* L.
(MAIZE)**

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NEW DELHI – 110 002**

PERFORMA FOR FINAL REPORT OF THE WORK DONE ON THE PROJECT

**1. TITLE OF THE PROJECT: TRIAZOLE INDUCED DROUGHT STRESS
AMELIORATION IN ZEA MAYS L. (MAIZE)**

2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR:

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3. NAME AND ADDRESS OF THE INSTITUTION:

Department of Botany
Annamalai University,
Annamalai Nagar – 608002

4. UGC APPROVAL LETTER NO. AND DATE:

F.No: 42-958/2013 (SR) dated 14.03.2013

UGC EXTENSION LETTER NO. AND DATE:

F.No. 42-963/2013 (SR) Dated: 22.06.2016

5. DATE OF IMPLEMENTATION: 01.03.2013

6. TENURE OF THE PROJECT: 01.04.2013 to 31.03.2017

7. TOTAL GRANT ALLOTTED : Rs. 9,74,800.00/-

8. TOTAL GRANT RECEIVED

1st Instalment : Rs.5,75,800.00/-

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

9. FINAL EXPENDITURE : Rs. 8,92,592.00/-

10. TITLE OF THE PROJECT : TRIAZOLE INDUCED DROUGHT STRESS AMELIORATION IN *ZEA MAYS* L. (MAIZE)

11. OBJECTIVES OF THE PROJECTS

The aim of present study was to evaluate drought stress, triazoles induced drought tolerance, plant growth metabolism and molecular variations in maize with the following objectives.

1. To select the suitable triazole compound to induce drought amelioration.
2. To find out the optimum concentration of triazole compounds for treatment of plants.
3. To study yield and biochemical variations among the triazoles treated plants.
4. To study the antioxidant activities of treated plants under drought stress.
5. To carry out RAPD and PCR studies to find out the genetic variability among the treated plants.

12. WHETHER OBJECTIVES WERE ACHIEVED (GIVE DETAILS)

- Collection of literatures and source materials
- Making field trips, collection of seeds and triazole compounds
- Fixing of parameters to be studied
- Optimization of treatment of triazole compounds through lab studies
- Preparation of agricultural field and making field trial at Botanical garden of Annamalai University
Evaluation of morphological characters
- Analyzing of photosynthetic pigments
- Estimation of protein, amino acid, proline, glycine betaine, starch and sugar. Estimation of antioxidant potential and antioxidant enzymes.
- RAPD and PCR analyses
- Statistical analysis
- Consolidation of results and documentation of research work

13. ACHIEVMENTS FROM THE PROJECT

- Relevant literature were collected
- During the field trips, Hybrid maize seeds syngenta (NK 6240) were obtained from Rasi Seed Company, Attur and triazole compounds namely triadimefon, paclobutrazol and hexaconazole were collected.
- Parameters to be studied were fixed
- Preliminary studies were carried out to find out the optimal doses and applied for further studies.
- Agricultural field was prepared in the Botanical garden of Annamalai University.
- Maize plants were raised and morphological parameters were studied.
- Photosynthetic pigments were analyzed

- Biochemical content like protein, amino acid, proline glycine betaine starch, sucrose and sugar analysis were done. Antioxidant potential and antioxidant enzymes were studied.
- Maize plant was raised RAPD and PCR analyses for control, drought and drought with triazole treated plant samples were done.
- Statistical analysis was studied.
- Consolidation of results and documentation of research work was done.

14. SUMMARY OF THE FINDINGS

Based on the present investigation, the following things can be Summary.

Drought stress decreased the growth parameters and pigment contents of the crop studied. Non-enzymatic antioxidants like ascorbic acid, -tocopherol and reduced glutathione contents were increased in the studied crop under drought stress. Enzymatic antioxidants like ascorbate peroxidase, superoxide dismutase, catalase and peroxidase activities were increased under drought condition. The treatment with triazoles triadimefon, paclobutrazol and hexaconazole to the drought stressed plants increased the growth parameters and pigment contents.

The treatment with triazoles to the drought stressed plants decreased the amino acid, proline, glycine betaine and total sugar contents in maize when compared to drought stressed plants. The activities of antioxidant enzymes like ascorbate peroxidase, superoxide dismutase, catalase and peroxidase deviated when compared to drought stressed plants. The triazoles treatment significantly inhibited the leaf area and shoot length, whereas they increased root growth, fresh and dry weights and pigment content of study crop. Triazoles with drought treatment significantly decreased the enzymatic antioxidants and non-enzymatic antioxidants when compare to drought stressed plants.

Among the treatments, the present findings revealed that the growth regulator treatments to the drought stressed plants have great impact on the morphology and physiological status of sunflower. Triazole can be used as potential ameliorative chemical to increase the drought tolerance, yield productivity and antioxidant defense mechanism of maize plants.

15. CONTRIBUTION TO THE SOCIETY

Increasing global population, shrinking of cultivable lands due to various kinds of human encroachment, changing of cultivable lands into wasteland due to drought and deviation of people from agricultural based life to other professions are necessitated the increased production of food with available lands and using various techniques.

Zea mays L. Is a one of the most important cereal crop. It is need very little water their cultivation need. No irrigation and do not burden the state with demand for irrigation and subsidies for fertilizers. They are adapted wide range of ecological conditions, can grow are sand, red soil and FYM. It is grown under the traditional methods, No maize attracts any pest, and they can be termed as pest free crops. Maize is amazing in their nutrition contents. All these qualities of maize farming system make them the climate change complaint crops. Finally it is concluded that the drought with triadimefon treatment provides greater change for the selection of desired characters.

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

Yes. Ph. D Enrolled

Roll No : 1219030002

Candidate Name : Mr. M. RAJASEKAR, project fellow on 31.03.2017

17. NO. OF PUBLICATIONS OUT OF THE PROJECT

- 1) **Rajasekar, M.,** G. Amalan Rabert and P. Manivannan., 2015. The Effect of triazole induced photosynthetic pigments and biochemical constituents of *Zea mays* L. (Maize) under drought stress. **Appl Nanosci., (Springer)** DOI: 10.1007/s13204-015-0482-y.
- 2) **Rajasekar, M.,** G. Amalan Rabert and P. Manivannan., 2015. Triazole induced changes on biochemical and antioxidant metabolism of *Zea mays* L. (Maize) under drought stress. **Journal of Plant Stress Physiology, 1(1):** 35-42.
- 3) **Rajasekar, M.,** G. Amalan Rabert and P. Manivannan., 2015. Growth and biochemical modifications in *Zea mays* L. as induced by triazole under drought stress. **International Journal of Current Research, 7(8):** pp.19421-19427.