ज्ञान-विज्ञान विमुक्तये

UNIVERSITY GRANT COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI-110 002

MAJOR RESEARCH PROJECT
EXECUTIVE SUMMARY (2013-2017)

PROJECT TITLE

SCREENING OKRA (*Abelmoschus esculentus* (L.) MOENCH) GENOTYPES FOR YELLOW VEIN MOSAIC VIRUS RESISTANCE COMBINED WITH HIGH FRUIT YIELD (RICE FALLOW) SUITABLE FOR COASTAL ECOSYSTEM

F.No. 42- 726 / 2013(SR) dated 25.03.2013

Submitted by

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Summary of the work done on the UGC- Major Research Project

1	**UGC Reference No. & Date**	**F.No. 42- 726 / 2013(SR) dated 25.03.2013**
2	**Name of the Principal Investigator**	**Dr. N. SENTHILKUMAR** Associate Professor
3	**Address**	**Office:** Associate Professor Department of Genetics and plant breeding Faculty of Agriculture Annamalai University– 608002 **Residential:** 130, 9th Cross Kanagasabai Nagar, Chidambaram – 608 001
4	**Department and university where the project has undertaken**	Department of Genetics and plant breeding, Faculty of Agriculture, Annamalai University.
5	**Title of the project**	**Screening Okra (*Abelmoschus esculentus* (L.) moench) Genotypes for yellow vein mosaic virus resistance combined with high fruit yield (Rice fallow) suitable for coastal ecosystem**
6	**Date of Implementation**	**01.04.2013**
7	**Tenure of the Project**	**3 years from 01.04.2013 to 31.03.2017**
8	**Total grant allocated**	**Rs. 1518606**
9	**Total grant received**	**Rs. 1398025**
10	**Final expenditure**	**Rs. 1265274**

Executive Summary

Yellow vein mosaic (YVM) is a serious dreaded disease of okra which is caused by begomovirus and transmitted by the vector whitefly. The crops are affected at all stages which produce very few deformed small fruits with yellosityw or white colour and not fitted to be marketing and incur heavy losses and could reduce the fruit yield by 50 to 70 percent (Duzyaman, 1997). Due to the non-availability of enough water for rice cultivation, farmers are restricting themselves for one season cultivation of rice, though there are some marginal irrigation facilities. Okra is the suitable vegetable crop for rice fallow land and for coastal ecosystem, since it is only vegetable with short duration (75-90 days), photo insensitive, and more profitable crop. Among vegetables, okra is a vital source of minerals, vitamins, proteins, dietary fibers and average

nutritive value (ANV) of 3.21 which is higher than tomato, eggplant and most cucurbits. India is the largest producer of okra with an area of 0.40 million hectares having the production of 4.1 million tones. In Tamil Nadu, okra occupies 3,400 ha with a low productivity of 6.5 t/ha. There is scope to increase the productivity of okra at 2.35 fold times (Paroda and Kalloo 1995). Spread of high yielding okra varieties and hybrids replacing hundreds of native varieties, land races, agricultural farms or primitive types are the foremost in all over the country.

We are also maintaining more than 100 germplasms of okra from different origins in our department. We have reported upto 85% reduction in fruit yield due to YVMV disease incidence. This includes even ruling varieties and also hybrids. The Principal Investigator did his M.Sc. (Agri.,) and Ph.D in Genetics and Plant Breeding and did also his research in the same crop on "Genetic Architecture of fruit Yield Components in Okra. Significant publications were also made in the same crop. The present day vegetable cultivation totally depends on pesticides spray. Regarding vegetables production in India, it is quite inadequate to meet the daily requirement (300 g for adults and 85 g for children) of the Indian diet. Among vegetables, Okra is suitable crop for tropical and subtropical regions including coastal areas and becoming an appreciable glass house crop in temperate regions also. Hence, to test the breeding lines for YVMV tolerance combined with high fruit yield, the conditions must be defined.

With this, the following objectives were proposed:

1. To determine the extent of genetic variability existing for fruit yield and its component characters over seasons with location.
2. To find out the level of YVMV resistance in different hot spot areas as well as in glass house condition by creating artificial ephiphytotic condition.
3. To evaluate the fruit yield potential of resistant lines in different location.
4. To ascertain the stability of identified resistant lines over environments in endemic areas.

Work planned and done:

First Year: The experimental materials were collected from various eco-geographical regions. The field experiment was conducted during three seasons at different location. It also included grafting test to confirm resistance.

Second Year: Superior field tolerant genotypes for YVMV were subjected to pot culture experiment for mass inoculation techniques with white flies. The test genotypes were subjected to DAC-ELISA technique to detect and quantify virus incidence.

Third Year: Promising high yielding and YVMV tolerant genotypes were evaluated along with ruling varieties and hybrids in replicated trial at different hot spots and at

farmer's field during three seasons.

Statistical analysis: All the statistical analysis will be performed separately for laboratory, glass house and field experiments. Pooled analysis will be done to identify the stable YVMV tolerant genotype combined with high fruit yield.

Results:

Nine genotypes out of thirty four genotypes namely Parbhani Kranti, Varsha Uphar, Chidambaram Local, NBPGR/TCR 2060, Hassar Unnat, Varangal Local, Punjap Padmini, Pusa A_4, PB 7 were identified as risk efficient genotypes on the basis of stability for high mean fruit yield and field tolerant to YVMV. These nine genotypes were forwarded to pot culture and laboratory experiment to identify efficient genotypes resistance to YVMV.

In order to find out the stability of resistance, the disease resistances in the selected nine genotypes were further confirmed through various analyses *viz.,* biochemical basis of disease resistance (phenol content of leaf), vector transmission (Spread of YVM virus by white fly), the leaves and fruits sample were subjected to DAC-ELISA technique, and physiological basis of disease resistance (Immunity to YVMV confirmed by graft inoculation techniques.

As evidenced in the above mentioned confirmation test, the highly resistant genotypes *viz.,* Parbhini Kranthi, Varsha Uphar, Punjap Padmini, Pusa A_4 and NBPGR/TCR-2060 out of nine genotypes possessed true and stable resistance which could be utilized for future breeding programs to develop new YVMV resistant okra varieties. The stability of Parbhini Kranthi, Varsha Uphar, Punjap Padmini, PusaA_4 and NBPGR/TCR-2060 for high fruit yield and resistant to YVMV was also conformed by conducting the MLT in the farmer's field during different season and at different hot spots.

Contribution to the society:

The identified genotypes showed field tolerance to YVMV disease (<15% disease incidence) combined with high fruit yield per plant, more number of fruits per plant and dark green fruits. The genotypes showing resistance to YVMV will be used as donor parent to develop a high yielding F_1 hybrid bhendi with resistance to YVMV with market preference. These genotypes can be cultivated as a variety during summer season because of tolerant to YVMV, whereas most of other commercial bhendi hybrids require at least 8- 10 times of pesticide spray for successful cultivation. The identified outstanding genotypes will be included in future Okra breeding programme.