

**SCREENING OF PINILISA DERIVED MUTANT LINES AND SELECTED
PIGMENTED RICE FOR RESISTANCE AGAINST RICE YELLOW
STEM BORER, *Scirphopaga incertulas* (Walker)
UNDER SCREEN HOUSE CONDITION**

MERJORIE CAJUCOM TABLADA

An Undergraduate Thesis Submitted to the Faculty of the Department of Crop Science,
College of Agriculture, Central Luzon State University, Science City
of Muñoz, Nueva Ecija, Philippines in Partial Fulfillment
of the Requirements for the Degree of

**BACHELOR OF SCIENCE IN AGRICULTURE
(Crop Science - Agronomy)**

JANUARY 2020

BIOGRAPHICAL SKETCH

Merjorie C. Tablada, also known as Merj by her friends and family was born on September 23, 1994 at Bongabon Hospital, Nueva Ecija. She is the youngest daughter of the two children of Elmer V. Tablada and Joan S. Tablada.

She finished her elementary education in 2007 at Sapang Buho Elementary School and her secondary in 2011 at Agricultural Science and Technology School, Central Luzon State University. With her dreams to pursue her college studies, she entered Central Luzon State University on June 2013 and took Bachelor of Science in Agriculture major in Crop Science and choose Agronomy as her field specialization.

ACKNOWLEDGEMENT

The author wants to express her sincerest gratitude to the following that contributed and supported in the completion of her baccalaureate degree as BS Agriculture student.

To her adviser, Dr. Franz Marielle C. Nogoy, for her patience, valuable suggestion help extended to her from the preparation of outline to the completion of the manuscript.

To Sir Ace Mugssy L. Agustin, her critic for her assistance, comments and valuable suggestions to further improved this manuscript.

To the Research office researchers especially to Sir Dave Aquino for supporting my seeds material for the conduct of the thesis.

To Dr. Ariel G. Mactal, Dean of the College of Agriculture, Sir Ace Mugssy L. Agustin, Department Research Coordinator, Dr. Rosemarie T. Tapic, Department Chairperson of Crop Science, Dr. Maria Luisa T. Mason, College Research Coordinator; and to all faculty and staff of Department of Crop Science for their comments and suggestions for the improvement of the manuscript.

To her classmate and friends., Jonamelle D., Izrael S., Dave D., who gave moral support and shared their time and helped me for my data gathering.

Lastly, to her parents, Mr. Elmer V. Tablada and Mrs. Joan C. Tablada, her sister Shalmae, her grandmother Erlinda Cajucom and her husband Krizal Patricio, for their moral support both financially and emotionally, as well as for their hard work and sacrifices.

Most of all to the Almighty God, who gave her strength and wisdom to succeed this thesis study.

TABLE OF CONTENTS

	PAGE
LIST OF TABLES	vii
LIST OF APPENDIX TABLES	viii
ABSTRACT	ix
INTRODUCTION	1
Statement of the Problem	3
Importance of the Study	4
Objectives of the Study	5
Time and Place of the Study	5
REVIEW OF RELATED LITERATURE	6
Plant resistance	6
Stem borer rice insect pest	7
Damage of stem borer	8
Varietal resistance to stem borer	10
Field screening	11
Screening of some rice varieties against rice stem borer	12
MATERIALS AND METHODS	13
Plant Materials to be used	13
Experimental Set up and Design	13
Establishment of Rice Seedlings	14
Sowing of Seeds	14
Maintenance of Seedlings	14
Transplanting of Rice Seedlings	14
Artificial Screening Method for Rice Stem Borer	14
Data gathered	16
Statistical analysis	18
RESULTS AND DISCUSSION	19
General Observation	19
Climatic Data	19
Percent Dead Hearts Damage	20

Percent White Heads Damage	23
Agronomic Data	25
Days to 50% Flowering	26
Plant Height at Maturity	27
Number of Productive Tillers	27
Number of Unproductive Tillers	27
Culm Length	28
Panicle Length	28
Spikelet Fertility	28
100 Grain Weight	29
Relationship of Dead hearts and White heads to Different Parameters	29
Dead hearts damage to spikelet fertility and 100 grain weight	29
White heads damage to spikelet fertility and 100 grain weight	30
SUMMARY, CONCLUSION AND RECOMMENDATIONS	31
Summary	31
Conclusion	31
Recommendations	32
LITERATURE CITED	33
APPENDICES	36

LIST OF TABLES

TABLE		PAGE
1	Standard Evaluation System for screening resistance to rice stem borer in dead hearts damage	16
2	Standard Evaluation System for screening resistance to rice stem borer in white heads damage	17
3	Measurement of dead hearts damage of different rice genotypes	21
4	Measurement of white heads damage of different rice genotypes	22
5	List of the promising resistant genotypes identified through artificial screening	24
5	Average performance of nineteen genotypes in stem borer and its agronomic characteristics	25

LIST OF APPENDIX TABLES

TABLE		PAGE
1	Analysis of variance on average % dead hearts of different genotypes	37
2	Analysis of variance on average % white heads of different genotypes	37
3	Analysis of variance on average plant height of different genotypes	37
4	Analysis of variance on average productive tiller of different genotypes	37
5	Analysis of variance on average unproductive tiller of different genotypes	38
6	Analysis of variance on average culm length of different genotypes	38
7	Analysis of variance on average panicle length of different genotypes	38
8	Analysis of variance on average spikelet fertility of different genotypes	38
9	Analysis of variance on average 100 grain weight of different genotypes	39
10	Correlations between dead hearts and white heads at spikelet fertility and grain weight of different genotypes	39

ABSTRACT

TABLADA, MERJORIE C, Department of Crop Science, College of Agriculture, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, December 2019, **SCREENING OF PINILISA DERIVED MUTANT LINES AND SELECTED PIGMENTED RICE FOR RESISTANCE AGAINST RICE YELLOW STEM BORER, *Scirphopaga incertulas* (Walker) UNDER SCREEN HOUSE CONDITION**

Adviser: FRANZ MARIELLE C. NOGOY, Ph.D.

Rice yellow stem borer (YSB) *Scirphopaga incertulas* (Walker) is one of the important internal insect pests causing serious damage to rice growing areas recently. Growing resistant variety is an excellent alternative to other management tactics. Identification of resistant or moderately resistant varieties for stem- borer damage is the prime step to forward direction. Nineteen genotypes were evaluated for resistance against rice stem borer under screen house condition. Inoculation was done at maximum tillering stage and reproductive stage of the rice plant. The stem with dead heart and white heads was checked for feeding symptoms of larva. The damage scale was calculated by comparing with the resistant check and susceptible variety. Among the three pigmented rice varieties, there are no genotypes that showed resistance. From the seventeen-mutant population, there are three genotypes (CSMP62a, CSMP87 and CSMP114) that showed resistance both in dead hearts and white heads. These breeding materials can be used as a potential donor for the resistance against rice yellow stem borer.

Keyword: Rice; Genotypes; Yellow stem borer; Artificial screening, Pinilisa

REFERENCES

- ABRO GH. LAKHO GM AND SYED TS. 2003. Relative Resistance of some Rice Cultivars to Yellow Stem borer, *Scirpophaga incertula* and Pink Stem borer *Sesamia inferens*. *Pakistan Journal of Zoology*. 85, 90-92.
- AKBAR A. MANZOOR B. 2003. Radio Sensitivity Studies in Basmati Rice. *Pak. J. Bot.*, 35(2), 197-207.
- BANAO MG. GUITAP EM. 2016. Agro-Morphological Characterization and Selection of Second Generation Mutant Lines in Pigmented Rice *Oryza sativa* L. "Pinilisa". Central Luzon State University, Science City of Muñoz Nueva Ecija, Philippines.
- BARRIENTOS DS. 2017. Morphological and Agronomic Characteristics of derived Mutants of Pinilisa Rice Cultivar. Central Luzon State University, Science City of Muñoz Nueva Ecija, Philippines.
- BERNAOLA L. STOUT M. 2018. Plant Resistance to Insects: A Fundamental Component of IPM. *American Entomologist* 62(2), 98-107.
- BONMAN JM. KHUSH GS AND NELSON RJ. 1992. Breeding Rice for Resistance to Pests. Annual Review of Phytopathology. The International Rice Research Institute, P.O. Box 933, 1099 Manila, Philippines. 30(3), 507-528.3.
- CATLING HD. ISLAM Z. 1981. The Problem of Yellow Borer in Asian Deepwater Rice. Paper Presented at Deep Water Rice Workshop. Agriculture, Ecosystem and Environment. (12), 47-71.
- CHAUDHARY RC. KHUSH GS. HEINRICH EA. 1984. Varietal resistance to Rice Stem borers in Asia. *International Journal of Tropical Insect Science*. 447-463.
- DEVASENA N. SOUNDARARAJAN RP. REUOLIN SJ. JEYAPRAKASH P AND ROBIN S. 2017. Evaluation of Rice Genotypes for Resistance to Yellow Stem borer, *Scirpophaga incertulas* (Walker) through Artificial Screening Methods. *Journal of Entomology and Zoologies*. 6(1), 874-875.
- DHALIWAL GS. ARARO R. 2001. Role of Phytochemicals in Integrated Pest Management. In; Phytochemicals Biopesticides. Harwood Academic Publisher. 97-117.
- HEINRICH EA. MEDRANO FG. RAPUSAS H. 1985. Genetic Evaluation for Insect Resistance in Rice. International Rice Research Institute, Los Baños Philippines. International Information System for The Agricultural Science and Technology. 356.

- INTERNATIONAL RICE RESEARCH INSTITUTE. 1976. Preliminary Report. International Stem borer Nursery, Los Baños, Philippines.
- IRRI. 2014. Standard Evaluation System for Rice. Edition 3, International Rice Testing Program (IRRI), Philippines. Edition 5; 30p.
- ISRAEL P. PADMANABHAN SY. 1977. Biological Control of Stem Borer of Rice in India. Final Tech. Annual Report. CRRI, Cutack.
- KANNO H. TATSUKI S. 1980. Distractions of Pheromone communication of Rice Stem Borer Moth. *Chilo suppressalis* Walker (Lepidoptera; Piraydae) With Sex Pheromone components and Related Analogues. Int. Symp. Problems Insect Pest Management Dev. Countries. Kyoto, Japan.
- KAPUR AP. 1967. Taxonomy of the Rice Stem borer. The major Insect Pest of Rice Plant. John Hopkins University Press. Baltimore, MD.
- KHAN M. SALJOQI AR. LATIF A. ABDULLAH K. 2003. Evaluation of Some Rice Varieties Against Rice Stem Borer (*Tryporyza incertulas*). *Asian Journal of Plant Sciences*, 2, 498-500.
- KHAN ZR. LITSINGER JA. BARRION AT. VILLANUEVA FFD. FERNANDEZ NJ. TAYLO LD. 1991. World Bibliography of Rice Stem borers, Center of Insect Bibliography and Ecology. International Rice Research Institute, Los Banos, Philippines.
- KHUSAKUL V. SARINGKOPHAIBUL S. RUAY-AREE S. AND PATANASUHI R. 1976. Current Status of rice Stem borers in taholand and Possibilities for Integrated Control. *Rice Entomology. Newsl.* 4. 31.
- LITSINGER JA. 1979. Major Insect Pest of Rainfed- Wetland Rice in tropical Asia. International Rice Research Institute. News sl.4. 14-15.
- PATHAK MD. 1968. Ecology of Common Insect Pests of Rice. A Review of *Entomology* 13. 294.
- PATHAK MD. 1969. Insect Pest of Rice. IRRI, Los Banos, Philippines.
- PATHAK MD. ANDRES F. GAACGAC N AND RAMOS R. 1971. Resisance o Rice Varieties to Striped Rice Borer. *IRRI Technology Bull.* 11, 69.
- PATHAK MD. KHAN ZR. 1994. Stem borers Insect Pest of Rice, International Rice Research Intstiture. Manila Phlippines. *Bull.* 11, 89.

- PHILIPPINE RICE R@D HIGHLIGHTS 2012, PHILRCE ISABELA, Adaptation Trial of Different Rice Varieties in Upland Condition /Cool Elevated Areas in CAR. p.26
- PRAKASA RAO PS, RAO YS, AND ISRAEL P. 1970. Problem and Prospects in the Chemical Control of the Rice Stem borer in India. In Major Insect Pest of Rice. p. 89. John Hopkins University Press, Baltimore. MD.
- PREETHA G. 2017. Screening of Rice Cultures/Germplasm for Resistance to Stem borer. *Journal of Entomology and Zoology Studies*. 5(6).
- RAO YS, ISRAEL P. 1967. Recent Development and Future Prospect from the Chemical Control of the Rice Stem Borer in India. In Major Insect Pest of Rice. Pp.317. Retrieved from <http://www.resistance terminology.com>. 2017.
- ROY D, BANDYOPADHYAY AK. 2014. Factors Contributing Towards Adoption of Aromatic Rice Production Technology in Nadia District of West Bengal. *Journal of Crop and Weed*. 166.
- SHINTA, SERAFINAH I AND ENDANG A. 2014. Morphological Variation of Six Pigmented Rice Local Varieties Grown in Organic Rice Field in Sengguruh Village Kepanjen District, Malang Regency. *The Journal of Tropical Life Science*. Volume 4(2). 149-150.
- SOOMRO AM, NAQVI MH, BUGHIO HR, BUGHIO MS. 2006. Sustainable enhancement of rice production through the use of mutation breeding. *Plant Mutation Replication*. 1:13-17
- STOUT M. 2014. Host-Plant Resistance in Pest Management Chapter 1. Integrated Pest Management. Pp. 1-21.
- VILLAMOR VISCAYA, Inquirer Headlines, Town pays homage to "Pinilisa". Retrieved from <http://newsinfo.inquirer.net/inquireheadlines/nation/view/20080129-115407>
- YUMUS MD, MOHAMMED Z, UDDIN K, SHAMSUL KM, GOLAM K. 2010. Glutinous Rice *Oryza sativa L.* Cultivars Grown on Coastal Soils of Bangladesh. *A Science Journal of Krishi Foundation*. 74.