

Performance of the Grain Legumes National Cooperative Testing (NCT) Project in Visayas State University, Baybay City, Leyte, Philippines

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Abstract

Before a variety is recommended to the National Seed Industry Council (NSIC), it must undergo a series of tests across several locations and seasons throughout the country. Therefore, regional NCT trials have been implemented to test the stability of the variety in terms of its characteristics, particularly on agronomic characteristics and pest and disease resistance. The Visayas State University (VSU) is one of the cooperating stations that conducted varietal trials and evaluated promising genotypes of legumes produced from the breeding programs from the government and private institutions. The University's involvement in the NCT trials for Legumes started in 2017. To facilitate the conduct of the different legume varietal trials, a project proposal was submitted to the VSU's Research, Development, Extension, and Innovation Office for funding support. After about five years of project involvement, there are already three (3) NSIC Mungbean, and two (2) NSIC Peanut registered varieties that can be used by the farmers and interested clients nationwide.

Keywords: National cooperative testing, Peanut, Pest resistance, Yield evaluation

Research article

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INTRODUCTION

To answer the demand for the leguminous crop products on peanut and mungbean, a continuous breeding program to develop resilient and high-yielding varieties of these commodities was done from the breeding stations in the government and private agencies (Sarcol and Cagasan 2016). Peanut (*Arachis hypogaea* L.) and mungbean (*Vigna radiata* L.) are the two (2) important grain legumes grown in the province of Leyte, Philippines. They belong to the Fabaceae family and are cultivated across Asian countries for their edible seeds. These are considered the cheapest plant protein and minerals sources, such as calcium and sodium. Legume crops are extensively grown in all soil types under varying climatic conditions. They can be planted not only as a monocrop but also as a rotation crop, relay crop, and inter-crop of late maturing crops like corn and upland rice due to their drought tolerance and early maturity (Labuschagne et al., 2016). Peanut and mungbean are also fast-growing crops with more herbage, making them excellent crops for green manuring (Peanut Growers, 2020).

Thus, growing legumes and integrating the whole crop into the soil as green manure is good, especially in rehabilitating marginal areas. Since legumes can fix nitrogen from the atmosphere, green manuring can maintain or improve soil fertility without direct costs for fertilizer (Singla and Babbar, 2015).

The market demand for this crop is increasing due to its various industrial uses. Hence, researchers and plant breeders have tried to breed and select resilient and high-yielding legume varieties to produce and release recommended NSIC legume varieties. Before a variety can be recommended to the National Seed Industry Council (NSIC), it must undergo a series of tests across several locations and seasons throughout the country. Regional NCT trials have been implemented to test the stability of the variety in terms of its characteristics, particularly on growth and yield, as well as on pest and disease resistance and tolerance (Escototo, 2020). VSU has been chosen as one of the cooperating stations of the National Cooperative Testing Program for Legumes. Hence, this project was implemented to develop and recommend high-yielding, pest, and stress-tolerant legume varieties to the National Seed Industry Council; and determine the best legume varieties for farmers in Eastern Visayas. In this article, the author would like to assess the performance and contribution of this NCT project not only to the farmers but also to the University's four-fold functions; instruction, research, extension, and production.

MATERIAL AND METHOD

The procedure for conducting NCT trials for legumes was based on the manual and guidelines developed by the technical working group (TWG) and approved by the National Seed Industry Council (NSIC) board. The experiment was laid out in randomized complete block design (RCBD) with four (4) replications. Different promising genotypes of legumes (peanut and mungbean) served as the treatments with NSIC Pn18 and NSIC Mg 17 as the national check varieties for peanut and mungbean, respectively (Bernabe, nd). The plot size was 5m x 2m with four rows per plot. Alleyways of 1.0 m between replication and 0.5 m between treatments were provided to facilitate farm operations and data gathering. The drilling method of planting was followed with a plant population of 7-10 plants per linear meter for peanut and 15-20 plants per linear meter for mungbean. A total amount of inorganic fertilizer was applied to peanut and mungbean with the recommended rate of 30-30-30 kg ha⁻¹ N, P₂O₅, K₂O. Complete (14-14-14) fertilizer was applied one week after seedling emergence. In addition, recommended cultural management practices such as weeding and irrigation were provided to maintain the crops' optimum growth and yield performance.

Every after harvest, the data will be placed in the data form a template developed by the NSIC Technical Working Group (TWG) for grain legumes.

RESULTS AND DISCUSSION

The project Contribution to the University's four-fold functions

The project goal followed the four-fold function of the University's, instruction, research, extension, and production.

University's four-fold functions	Project's Contribution
1.Instruction	The project will serve as the demonstration area for legume production that will cater to agriculture students to observe their farm activities from land preparation up to harvesting and collecting pests in the field for the pest management significant students in the University.
2.Research	The project will also provide the latest legume varieties as a source of planting materials used for research activities by the student's thesis and faculty.
3.Extension	The project will serve as a site demonstration for the extension project of the Department of Agronomy, such as technical assistance to the farmers to improve their peanut yield.
4.Production	This is only for research and extention purposes not for production and to gain net income.

Self-Assessment of the Project

Overall Management

Items	Last Year's Performance Rating (1-10 scale), NA if not applicable	Details or justifications for the rating provided
1. Able to sustain the gains of the project carried over from the previous administration	5	The year 2021 was considered a failure for the cropping season due to the Covid 19 Pandemic and typhoons damaging some of the experimental crops. As a result, no students and clientele are allowed to enter the University.
2. Able to manage and improve the efficiency of workers	7	Due to the faculty's heavy workload on instruction and research activities and the transition period for the online classes.
3. Able to implement initiatives to improve the productivity of workers	8	The project was improved interms of project operations in field, delivery of seeds as planting materials from the breeders. This project was managed by one and managed by oone research assistant, one laborer and one the study leader.

4. The project falls within the mandate of the unit	10	This is part of the department and university's goal to provide the university's four functions (instruction, research, extension, and production).
5. Maintenance of a peaceful environment in the project	8	No requests for mediation to settle disputes within the project and environment.
6. Worker turn-over degree	8	None
7. Worker retrenchment	9	No reduction of workers
8. Frequency of requests for mediation to settle disputes within the project	4	No requests for mediation to settle disputes within the project
9. Adherence to BOR/CHED/DBM policies/guide lines	9	The project protocols adhere to the DBM policies
10. Practicing transparency in all transaction	10	All activities in the field, laborers, and other field costs were monitored by the COA. The sales were remitted directly to the cash division office.

Research Management

The project provided a research component and was managed by the personnel to deliver the output to the students and other clientele interested in the legume crops. Hence, this was evaluated based on the project leader assessments.

Items	Last Year's Performance Rating (1-10 scale), NA not applicable	Details or justifications for the rating provided
1. Have made improvements/innovations in the project based on research results	6	No proper research/interventions were done on the farm sites. Still, the project proposal was submitted to VSU RDEI Office.
2. Extended support to the research community to improve research capability	6	No proper research/interventions were done on the farm sites. Still, the project proposal was submitted to VSU Extension Office.

3. Provided infrastructure to improve research capability	6	The laborers only maintained irrigation canals. No other infrastructure was established.
4. Adoption of relevant technologies	7	Farmers and interested clientele follow modern legume technology, such as certified seeds and proper use of inputs (chemical fertilizers and pesticides).

Extension Management

The project provided a demonstration area for the visitors, and students conducted practicum for their skills development and on-the-job training. Also, for other individuals who are interested in studying legume crops.

Items	Last Year's Performance Rating (1-10 scale), NA not applicable	Details or justifications for the rating provided
1. Alignment of the project with instruction and extension	7	Caters major agronomy students for their laboratory classes and demonstration for extension
2. Formulated and implemented creative outputs to bring project output to intended clientele	8	The NCT project was utilized by the Agronomy major students as a training demonstration site and also for the department's extension activities.
3. Provided mentoring services and established partnership arrangements with clientele or interested parties	7	Cater's primary agronomy students for their laboratory classes, thesis, and any individual interested in growing legume crops.
4. Sustainability of implementing a project	8	Sustainability of production system for the farmer.
5. Transfer of knowledge and expertise to interested parties	7	Caters major agronomy students for their laboratory classes and research.
6. Technologies extended or demonstrated	8	Provides training program on the production and management of the different cultural management practices for the grain legumes to agronomy major students specifically for their skills development (practicum) and also to interested farmers/technicians on their NC II and III in Crop Production.
7. The extent to which the project is used for the University's extension function	7	The project serves as a laboratory facility for instruction and research and the department's extension program activities as the training demonstration area.

Production Management

Items	Last Year's Performance Rating (1-10 scale) NA is not applicable	Details or justifications for the rating provided
1. Level of revenue /yield generated from the project	6	The yield of legumes was relatively lower because of erratic climatic conditions that affect the operations, especially during wet season cropping. However, during the dry season cropping, it was suitable for the legume crops.
2. Number of other potential marketable products of the project	5	The project for NCT legumes is solely for genotype screening. Thus no other product was produced in the project.
3. Employed strategies or technologies to increase income generation or production	5	Adoption of low-cost land preparation, other cultural management practices, and proper/efficient use of inputs must be observed in the project operations.
4. Level of income generated from commercialization of products generated from technology developed	6	The introduced technology or the newly approved/registered NSIC legume varieties need to propagate in all cooperating stations throughout the Philippines to have more quality planting materials to be used by farmers and other interested individual.

Financial Management

Items	Last Year's Performance Rating (1-10 scale) NA is not applicable	Details or justifications for the rating provided
1. On-time payment of salaries and benefits	NA	On-time salary of workers in the NCT project is to be prioritized
2. On-time payment to suppliers	NA	None
3. Adherence to COA policies	8	Job order workers are in adherence to COA rules and regulations.
4. Efficiency in the utilization of GOP budget	NA	No GOP needed
5. Efficiency in the utilization of income	8	The income in the project was also monitored and submitted to the university cashier's office.
6. Amount of annual savings	8	The money was deposited in the cash division office under the general fund

8. Practice record keeping	10	Income generated from sales was properly recorded and remitted to the treasury of the University.
9. On-time submission of financial reports	9	Sales report was supported by sales receipts from the commercial buyers and checked by the IASSO personnel. In addition, financial reports were submitted to IASSO.

Logic Framework

The VSU-NCT 1718 Project uses the standard protocols to conduct the National Cooperative Testing Project through the NCT Legumes manual (Singla et al. 2015).

INPUT	ACTIVITIES	OUTPUT	OUTCOME	IMPACT
<ul style="list-style-type: none"> • Experimental area • Mechanization (tractor) • Field supplies • Human resources (Research Aid & laborer) • Project Funds 	<ul style="list-style-type: none"> • Land Preparation • Planting • Hilling up • Weeding • Fertilizing • Harvesting • Processing • Data gathering 	Conducted two wet seasons and two dry season trials for peanut and mungbean yearly	Efficiently utilized the data from the trials. Thus, three new Mungbean varieties were recommended by the TWG and approved by NSIC in 2021 for release as new varieties.	<p>More NSIC legume varieties have been released.</p> <p>Food Security</p>

Summary Output Matrix

The VSU-NCT 1718 Project follows the National Cooperative Testing Program for Legumes manual using the matrix below (Loko et al. 2020).

Expected Output	Details (2021)	Target/Planned (2022)	Actual Accomplishment/ Output To Date	Percent Accomplished
Place National Cooperative Testing Program for Legumes	Established four trials per year using ten entries for each crop (mungbean and peanut)	Conduct 2 trials in wet and dry seasons for both mungbean and peanut	Collected and analyzed data for two croppings (wet and dry season) for two crops (mungbean and peanut)	100%
Patent Three promising genotypes of mungbean recommended to NSIC	Submission of complete data of the three recommended mungbean genotypes	Approval by the NSIC of the three recommended mungbean genotypes	NSIC approved the three recommended mungbean genotypes as new NSIC varieties	100%

People Mentoring students in research	Conduct thesis for one agronomy major student	Graduated one agronomy major student	Graduated and mentored one agronomy student	100%
Product New NSIC-recommended Mungbean varieties	Conduct trials and evaluate data for recommendation to NSIC	NSIC released Mungbean varieties	Submitted data to TWG for evaluation	100%
Policy NCT manual	Review and amend NCT manual in conducting the trials	Improved NCT manual	Revised NCT manual	100%
Publication Published article	Develop two papers for publication in referred Journals	Submit papers for publication	Submit two papers for publication	80%

Problems Met and Action Taken

Problems Encountered	Actions Taken
<p>1. LOW PRODUCTION- caused by the following factors:</p> <p>a. Weather Conditions Continuous rains and frequent visit of typhoons which affected field operations and cultural management practices like the application of fertilizer and pesticides</p> <p>b. Lack of Inputs</p>	<ul style="list-style-type: none"> • Adjusted activity schedule and implementation • Timing of planting to minimize damage/sterility of grains caused by continues raining and strong wind (southeast moonson or habagat). • Proposed support on the credit of fertilizer and other chemical inputs to the cultivator

CONCLUSION AND RECOMMENDATION

The project served as the techno-demo for the grain legume crops that will cater to agriculture students and other interested stakeholders. The project served 15 students, five faculty, and 25 farmers who conducted their extension project on legume production technology. They also published other significant outputs of the projects, like the latest performance of NSIC-released legume varieties in Eastern Visayas. The project conducted two trials for the wet season and two for the dry season for both mungbean and peanut. The data were consolidated and submitted to NSIC for review and evaluation. In 2021, three promising lines of mungbean and one peanut were released by the NSIC as new legume varieties.

It is also recommended that the new workers must be trained for modern cultural management practices for grain legumes crops. In addition, the adoption of low-cost weed and nutrient management must be properly observed.

LESSONS LEARNED

1. An integrated crop management approach (water, soil fertility/nutrients, weeds/pests/diseases, and post-harvest processing) is vital to maximize the productivity and profitability of legume farmers/cultivators.
2. All technologies and practices should be used synergistically to help farmers increase and maintain yields and reduced production cost.
3. Improving the quality of legume seeds and shelling recovery will enhance farmers' profitability.
4. We need to train the extension staff and equip them with adequate technology to educate their farmer-clients on modern legume farming.

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