Eurasian Journal of Agricultural Research 2020; Vol: 4, Issue: 2, pp: 81-91

Comparative Assessment of the Researcher-Managed and Farmer-Managed Onion (Allium cepa L.) Production in Sto. Domingo, Nueva Ecija, Philippines

Ulysses A. Cagasan

Department of Agronomy, Visayas State University, Visca, Baybay City, Leyte 6521-A, Philippines

Corresponding Author: ulycagasan@vsu.edu.ph

Abstract

A comparative assessment is a vital tool in the farmer's practice on their farm and compares the researcher's practice on how it varies in terms of its operation and productivity. It is also a good idea to assess it in a commercial scope of production. This study aimed to assess, compare, and give the farmers the recommended commercial onion production practice. This was possible through a survey conducted, assess, and compare the two management practices of growing onion crops by the researcher and the farmer-managed onion production. A survey of onion growing areas in Brgy. San Fransisco in Sto. Domingo, Nueva Ecija was done to determine the differences between the researcher-managed and farmer-managed in its farm management and operations. The survey results revealed that the researcher's technologies have done for a long time; therefore, it needs some verification to update the information. However, it is still useful to have a guide to improve the technology either on the farmers` side and to the researcher's end. Therefore, for successful adoption of the technology, it should be tested first in the specific locality before recommending it to the farmers, or the farmer should experiment on a small portion of their farm before doing it in a commercial plantation. The farmer's practiced also reveals some innovative way of doing farm activities practically and proven effective for productivity and income.

Keywords: Onion production, research, farmer's managed, net income

Research article
Received Date: 16 November 2020
Accepted Date:30 November 2020

INTRODUCTION

Bulb onion (Allium cepa L.), locally known as sibuyas, is probably the most indispensable culinary ingredient not only in the Philippines but probably in the world. It is a favorite seasoning, and its pungent aroma and sharp taste make it ideal for spicing up meat, salads, and vegetable dishes (https://businessdiary.com.ph/6051/onion-production-guide). It is also used to cure various physiological disorders such as cough, obesity, insomnia, hemorrhoid, and constipation. In 2019, the volume of onions produced in the Philippines was approximately 222.1 thousand metric tons. In 2018, the production value of onions in the country was about 6.7 billion Philippine pesos (Onion Production in the Philippines 2019). In Central Luzon, the top producer of red onion at 19.74 thousand metric tons accounted for 51.9 percent of the country's total production. MIMAROPA followed this with 42.4 percent, and Ilocos Region, 2.6 percent. However, the production of onion in Nueva Ecija, particularly in the municipality of Bongabon (the leading producer of onion in the Philippines and probably in Southeast Asia), is expected to increase following the introduction newer and pest-resistant varieties. Onion production fits very well in the rice farming system in selected regions of the country. These are usually grown after rice towards the dry season when water is not sufficient for another rice crop. Farmers utilize the rice straw from the previous cropping as mulching materials in allium production. They consider onion and garlic as good cash crops with high returns to investment, Lopez, and Anit (1994).

A survey and field visitation was done in Sto. Domingo being one of the onions producing areas in Nueva Ecija, to conduct a survey and focus group discussion (FGD) with the vegetable farmer leaders. The FGD group was led by a model farmer named Ging Gamboa, an Engineer who ventured into the vegetable farming business in Sto Domingo, Nueva Ecija. We interviewed two researchers from the Central Luzon State University, Science City of Munoz, Nueva Ecija, to verify their practice and ask the guide on the cultural management practices they developed for onion bulb production. A comparative assessment is an essential tool in knowing the condition of the farmer's practice in their farm and to compare the researcher's practice on how it varies in terms of its operation and management. This study aimed to assess, compare, and give the farmer's recommendations, the best practice of commercial onion production.

METHODOLOGY

The method used in the study was done by gathering ten onion farmer leaders through focus group discussion (FGD). All the information asked the farmers were guided with standard cultural management practices for onion production published by the onion researchers (Abon et al. 2015). The area was visited, and the farmers were interviewed and observed for their activities on the farm.

Figure 1. Area planted with onions one month after planting

Figure 2. Onions production using double rows planting

Figure 3. Onion plants and rice on the field

RESULTS and DISCUSSION

Table 1 present the result of the focus group discussion among the onion farmers in Sto. Domingo, Nueva Ecija, Philippines. The different cultural management practices between the researcher-managed and the farmer-managed onion production. We conducted an FGD with the farmer leader and some researchers in CLSU. We also interviewed a model and awardee farmer (Ging Gamboa) and got some reliable information. According to her, there are some practices recommended by the researchers that need to be verified. For example, the actual irrigation of the crops from planting up to harvesting during dry season cropping. It needs 13-16 times of irrigating the onion crop until harvest compared to the researcher's recommendation, which has only 5- to 8 times for clay loam soil and 8-10 times for sandy loam soil. According to (Ging Gamboa) the farmer, the practice of 5-10 times irrigation and the amount of fertilizer of 10 bags also lacks, which is impossible to produce high yield and onion quality. The technology is very location-specific that needs to be verified in a specific location before recommending it to the farmers. Mostly, some management changes from time to time, as the farmers observed in their respective farms. We also convinced the farmer's experience on how a crop is being grown in their respective farms compared to the researcher's itself because researchers only experimented once, twice, or trice compared to the farmers that did the farming for the whole life.

Also, the researcher's technologies have done for a long time; therefore, it needs some verification to update the technology's information. However, it is still useful to have a guide to improve the technology either on the farmers` side and to the researcher's end. Therefore, it must be tested first in the specific locality before recommending it to the farmers for successful adoption of the technology. The farmer should experiment on a small portion of the farm before doing it on a commercial plantation.

Table 1. Information gathered from the farmers comparing the results of the researcher's versus the farmer's practice

Particular Information	**Researcher-Managed**	**Farmer-Managed**
1. Importance of the crop to the farmers	Onion is one of the country's most important crops. Its prominence stems from its varied utilization and medicinal value, particularly in curing many physiological disorders such as hemorrhoids, constipation, and menstrual discomfort. It is also considered a potential aphrodisiac. In Nueva Ecija and Ilocos provinces, onion is a significant crop that provides a good income source among farmers.	There are two types of bulb onion grown in the Philippines, the white and the red onion. The white varieties grown for the traditional market are either the granex (flat) or the grano (round) type, short-day onions. The red varieties, on the other hand, are produced because of their long storage life. Strains of Red Creole and Red Pinoy are among the widespread varieties being grown. Bulb onions are grown in about 11,998 ha (2017), mainly in Central Luzon and the Ilocos Region. They are grown both for the local and export markets.
2. Recommended varieties used by the growers	Yellow Grannex Red Creole Red Pinoy	Hybrids Red Orient Superex Red Creole Cal 120 Red Pinoy Cal 202 BGS 95 (F1 hybrid) Liberty Capri Yellow Granex
3. Site Selection/Soil Type	The area should have dependable irrigation and transportation facilities. Soil texture suited for onion production is sandy clay or clay loam. River deltas are excellent in growing areas.	Site selection of onion production is the same between research and farmer's management. They observed that bulb onions grow well in friable and well-drained loam soil with good water holding capacity. Onion requires cooler weather during the early stages of growth and a dry atmosphere with moderately high temperature for bulb development & maturation for best growth and bulb quality. Planting can be done as early as October (red onions).
4. Growing Season 5. (the same)	The season of planting is the same between research, and farmers managed onion production. They are planted during the dry season when the water is not sufficient for rice requirements. It is grown from October to February and is generally planted after rice under Central Luzon in Nueva Ecija areas.	The season of planting is the same between research, and farmers managed onion production. They are planted during the dry season when the water is not sufficient for rice requirements. It is grown from October to February and is generally planted after rice under Central Luzon in Nueva Ecija areas.
6. Seedbed Preparation (the same)	The seedbed soil must be loose and friable. This is attained by covering the area with rice hull about 3cm thick and then burned. Plow and harrow the seedbed twice. Prepare seedbed with a dimension of 1 x 10cm and raise it to at least 15-20 cm from the ground. Sow 0.5kg of seeds per seedbed at ten seedbeds, enough for 1 hectare.	

7. Seedling Production	Mix ½ kg of seeds with ½ kg of fine soil to attain an equal distribution during sowing. Cover the seeds with a 1 cm thick rice hull. Water the seedbeds morning and afternoon for 20 days, and once-daily after that, using a sprinkler. Apply fertilizer by dissolving 50g urea per kerosene can water 14 days after emergence (DAE). Repeat the operation every two weeks. Spray insecticide when necessary during the seedling stage and water the seedbeds before pulling of seedlings.	A 1-ha production area requires ten cans (1kg/can) of seeds. A 300-500 m2 seedbed produces enough transplants for one ha. Prepare beds 1 m wide & incorporate animal manure and rice hull. Line sows 3-5 kg seeds in rows set across the bed 7-10 cm apart. Distribute seeds thinly and evenly cover the seeds lightly with compost and mulch with rice straw or grass clippings to maintain adequate soil moisture and protect the seedbed against direct sunlight and rain with nylon net removable plastic tunnels. Reduce watering and expose seedlings to full sunlight one week before transplanting.
8. Land preparation	There are three methods recommended by researchers for land preparation in onion production. 1.1 **Conventional land preparation**. Cut the rice stubbles and use them as mulch. Plow the field once and harrow twice to obtain good tilth. Cover the prepared land with mulch a week before transplanting. Construct desired trenches along the perimeter and at the center of the paddy. 1.2 **Zero tillage.** Cut the rice stubbles a week before transplanting and immediately mulch the area. Construct desired trenches along the perimeter and at the center of the paddy.	Land preparation is done one month before transplanting. The use of tractor-driven implement requires 1-2 plowing & harrowing operations. Some farmers also used carabao-drawn implements, especially those areas with less than 0.5 hectares.
9. Transplanting	Transplant one seedling per hill spaced 15cm x 15cm, 40-45days after emergence. Dibble the seedling 1cm deep. The space between rows will be provided as a canal for water irrigation.	Transplant seedlings 4-5 weeks after sowing gently uproot the seedlings to prevent root damage. Plant at a distance of 15 cm between rows & 3-5 cm between transplants can also be practiced. Use markers for proper spacing & to facilitate transplanting. After marking, use dibbles to make holes. Plant deep enough but not too profound. Care must be taken so as not to damage the basal portion of the plant. Place the white portion of the plant below the soil surface. Press the soil firmly around the basal portion. Irrigate the field before and after transplanting. We also observed some onion farmers followed a double row planting using in between rows/space for canal during water irrigation. However, the model farmer (Ging Gamboa) followed a flatbed method;

		she had a small box (kahon) 3m by 3m size planted with closed distance onion 3cm by 3cm. A small box was adopted to control water during irrigation and have evenly distributed water to the plants within the 'kahon' during irrigation.
10. Fertilizer Application	Chicken dung ten bags before planting, then two bags of urea and three bags applied 14 days after planting. Urea 2 bags and complete three bags applied at 50 days after planting.	In the absence of soil analysis, a 1-ha production area requires 8.5-11.5 bags of ammonium sulfate (21-0-0), 6.5-26.5 bags superphosphate (0-18-0), and 2-4 bags muriate of potash (0-0-60). Apply all of 0-18-0 & half of 21-0-0 & 0-0-60 as basal fertilizer. Side dressed the remaining 21-0-0 & 0-0-60 at 30, 45 & 60 days after transplanting. High nitrogen rates tend to shorten the storage life of onions. Combine herbicide application with hand weeding to produce a good quality crop.
11. Weeding and Cultivation	Weeding and cultivation are the same with research and farmer's managed. The weeding operation will start one month after transplanting. Repeat the operation as the need arises.	
12. Irrigation	Irrigate the field at various growth stages as follows: First : 3-5 days before transplanting or right after mulching. Second: two weeks after transplanting or after the first application of fertilizer Third: at the early bulbing stage (50 DAT). Fourth: at bulbing stage (60 DAT) Fifth: optional, depending on the plant condition and soil moisture status. Sandy loam soil requires 6-10 irrigation.	Bulb onions require adequate moisture for steady, continuous & desirable growth. Depending on soil types, irrigation varies between 3 & 5 days interval depending on the soil condition. Stop irrigation 2-3 weeks before harvest, or when 20-30% of the tops fold over. The last irrigation should be a light one. It needs 13-15 times for irrigation of onion from field transplanting until harvest.
13. Insect Pests and Diseases Control (the same)	Insect pests and disease control are more or less the same (Researcher-managed and Farmer-managed). They sprayed as soon as the pest appear and be repeated for ten days after or depending on infestation level. The rate of application will be followed by the manufacturer's recommendation (Table 2).	

Table 2. Pest management

Insect Pests/Diseases	Suggested Pesticides		Rate of application (tbsp/16 li water)	When and How to apply
	Common name	Product name		
A. Insect pests				
Cutworm, Armyworm	Cartap hydrochloride	Padan 50 SP	1.5 – 2.0	Spray any of these Insecticides as soon as insect pests appear.
	Profenofos			
	Lambacyhlothrin	Selectron 500 EC	3.0 – 5.0	
		Karate 2.5 EC	1.0 – 1.5	
	Lambacyhlothrin			
Leafminer, Thrips		Karate 2.5 EC	1.0 – 1.5	Repeat spraying at 10 days interval
	Thiamethoxan	Padan 50 SP	1.5 – 2.0	

		Trigard 75 WP Actara 25 WP	2.0-3.0	depending on level of insect infestation.
B. *Diseases*	Mancozeb			Start spraying when symptoms of disease appear and repeat at 7-14 days interval.
Purple blotch	Fluazinam	Dithane M-45	4.0 – 6.0	
	Chlorothalonil	Frowncide 50 SC	2.0 – 3.0	
	Copper hydroxide	Daconil 75 WP	4.0 -6.0	
		Funguran-OH	1.0 – 4.0	
	Carbofuran			
Root galls		Furadan 5 G plus fresh chicken manure	1 bag + 2 tons/hectare	

Table 3. Post-harvest Handling and processing of onion bulbs

Particular Information	**Researcher-Managed**	**Farmer-Managed**
Post-harvest Handling	Trim the onion roots and leaves right after harvesting or one day after piling them under the sun. Use sharp knife or scythe and cut 4-6 cm from the bulb. Separate the small, medium, large bulb for proper sorting and marketing. Cure the bulb right after trimming by air drying at room temperature.	The bulbs will grade according to size & quality. Clean the bulbs by peeling off the outer peelings. Pack in jute or net sacks for storage and/or immediate disposal. Arrange in crates and store in a well ventilated place free from high moisture and exposure to the sun ready for transport to market.

Table 4. Cost and return analysis for 1hectare bulb type onion production. (comparing between farmer's and researcher's managed)

Quantity	**Quantity**	**Quantity**	**Unit**	**Rate/Unit**		**Value (P)**	
I. GROSS INCOME							
Researcher-managed	25,000		kg	20		**500,000**	
Farmer-managed	25,000		kg	20		**500,000**	
I. EXPENSES	**Managed by**			**Managed by**		**Managed by**	
1. LABOR	***Researcher***	***Farmer***	***the same***	***Researcher***	***Farmer***	***Researcher***	***Farmer***
Seedling production						TOTAL AMOUNT	
Seedbed preparation and sowing	4	3	MD	500	350	2000	1050
Watering/fertilizer appln	4	3	MD	500	350	2000	1050
Pulling	2	2	MD	500	350	1000	700
Land Preparation							
Plowing (once)	6	6	MD	500	350	3000	2100
Harrowing 2 times	5	4	MD	500	350	2500	1400
Cutting stubbles	10	10	MD	500	350	5000	3500

Construction of trenches	5	5	MD	500	350	2500	1750
Mulching	6	0	MD	500	350	3000	0
Planting	25	25	MD	500	350	12500	8750
Care of plants							
Weeding	20	20	MD	500	350	10000	7000
Controlling of insect pests	4	5	MD	500	350	2000	1750
Fertilizer application	5	5	MD	500	350	2500	1750
Irrigation	10	15	MD	500	350	5000	5250
Harvesting	25	25	MD	500	350	12500	8750
Trimming/curing/drying	5	5	MD	500	350	2500	1750
Sorting	5	5	MD	500	350	2500	1750
Hauling	2	2	MD	500	350	1000	700
Cleaning/sorting /packaging	10	10	MD	500	350	5000	3500
SUB-TOTAL						78,500	52,150

1.MATERIAL INPUTS							
Seeds	5	5	kg	1500	1500	7500	7500
Fertilizer							
Complete	6	6	bags	1500	1500	9000	9000
Urea	3	5	bags	1500	1500	4500	7500
Amm sulfate	0	3	bags	0	700	0	2100
Muriate of potash	0	3	bags	0	705	0	2115
Chemicals							
Karate	1	1	li	1500	1500	1500	1500
Selecron 500 EC	1	1	li	750	750	750	750
Padan 50 SP	1	1	kg	750	750	750	750
Dithane	1	1	box	450	450	450	450
Gasoline	35	35	li	60	60	2100	2100
Oil	8	8	li	200	200	1600	1600
Jute sacks	1000	1000	pcs	15	15	15000	15000
SUB-TOTAL						43150	50365
TOTAL ON LABOR & INPUTS						121,650	102,515
Overhead Expenses							
Research (Land charge [1/])						10,000	10,000
Interest on capital [2/]						17234	17234
TOTAL EXPENSES						148,884	129,749
NET INCOME per Hectare						351,116	370,251

[1/] Land charge is based on payment to Riceland, computed at 15 cavans/ha at 46kg/cavan at P15/kg

[2/] Capital is based on labor and inputs. Interest rate is 28 % per annum. Onion (Bulb type) production and marketing covers six months.

COST and RETURN ANALYSIS

The cost and return analysis was presented in Table 4. Comparing the two practices (researcher and farmer-managed), I noticed in the expenses on labor that there was a higher expenses incurred on the researcher's side because the rate of the laborer is much higher (P500.00) as compared in the farmer-managed of (P350/day) (Table 4).

However, for the inputs the farmer managed had a higher cost of inputs because the fertilizer requirements that they had adopted is higher than the researcher's practice. The farmers did not get soil analysis for laboratory to get the actual nutrient content of their soil before planting as compared to the researcher-managed area. Soil analysis is recommended to minimize loses or over application of fertilizer is controlled thus, fertilizer use efficiency will be achieved. Also the number of irrigation/watering is also higher as experienced by the farmer. Perhaps it will vary depending on the location, season, type of soil, variety used either (early or medium maturing).

According to the farmer that we interviewed it needs 13-16 times of irrigating the onion crop until harvest as compared to researcher's manage which has only 5- to 8 times and sandy loam soil needs 8-10 times. According to (Ging Gamboa) the farmer, the practice of 5-10 times irrigation as well the amount of fertilizer of 10 bags is also lacking which is impossible to produce high yield and quality onion. However, comparing the yields produce, they have the same kg produced per hectare. The basis for our computation on the yield is this: 1 tenth of a hectare (according to her, 1 pound or one can of seeds equivalent to 1/10 of a hectare. This area produced more or less 100 bags at 25 kg per bag, equivalent to 2500 kg per 1/10 area. If we convert it to hectare, we multiply it to 10, equivalent to 25,000 kg per hectare comparable to the research-managed farm. Based on the cost and return analysis (Table 4.) the yield obtained under the farmers` practice are comparable. However, the total cost of production is higher under researchers` management due to the higher daily wage given to the workers under the standard minimum wage law given by the workers.

IMPLICATIONS

Researcher's technologies have done for a long time; therefore, it needs some verification to update the information. However, it is still useful to have a guide as a basis for improving the technology either on the farmers` side and to the researcher's end. Therefore, for successful adoption of the technology, the technology must be tested first in the specific locality before recommending it to the farmers. The farmer should do the experiment on a small portion of the farm before doing it on a commercial plantation.

RECOMMENDATIONS

Based on our results of the study/observation in the farmer area, some recommendations can be shared with the farmers.

1. The fertilizer used by farmers is either higher or lower than the actual requirements. So, there's a need to analyze the soil nutrient status of the farmer's area so that fertilizer use efficiency is maximized. To do this the local government unit must help or subsidize the cost.
2. The distance of planting will also be studied as the density will affect competition with growth factors such as water, light, nutrients, and space.

3. The program of planting and crop rotation is encouraged to minimize build-ups of pests and diseases in the area; also, the soil's organic content be improved by using leguminous crops.
4. Adopt integrated pest management to minimize the use of harmful chemical pesticides, which is very harmful to the environment and animals and human beings.
5. For successful adoption of the technology, it is essential that it be tested first in the specific locality before recommending it to the farmers. The farmer should experiment with a small portion of the farm before doing it on a commercial plantation.
6. If possible, the Department of Agriculture (DA) will assist not only on the technology but also on the financial aspects, especially those farmers who have no enough money to provide during crop production.
7. The government will also consider the concern of the farmers, especially during the marketing of their produce.

REFERENCES

Abon C C Jr., Legaspi B.V. & Patricio M.G. Technology for Onion Production

Chang K., 2004. Introduction to Geographic Information Systems. McGraw-Hill Companies Inc. New York, New York. CIA. 2003. Visited: 08/27/2003. The World Factbook: Bolivia http://www.cia.gov/cia/publications/factbook/geos/bl.html Crivelli, C. 1911. modified: 2003, visited: 09/16/03. The Catholic Encyclopedia, Volume XII. http://www.newadvent.org/cathen/12140a.htm

Lopez, E.L. and Anit, E.A. (1994). ALLIUM PRODUCTION IN THE PHILIPPINES. Acta Hortic. 358, 61-70. DOI: 10.17660/ActaHortic.1994.358.8. https://doi.org/10.17660/ActaHortic.1994.358.8

Rivas E., 2001. Descripcion Gral de la Cadena de la Cebolla en los Valles de Bolivia. Unpublished. Given to me by Marcos Moreno of FDTA-Valles June 2002.

Rivas E., 2002. Plan de Comercializacion de Cebolla Seca. Unpublished. Given to me by Marcos Moreno of FDTA-Valles June 2002. Production, Technoguide for all Agronomic crops, Research Division, CLSU, Munoz, Nueva Ecija.

Pcarrd-Da., 2000. Bulb Onion Production Guide. Los Banos Laguna, www.openacademy.ph; Photos: Wikimedia, ttps://www.agriculture.com.ph/2019/08/07/a-promising-new-red-onion-variety/

Onion Production in the Philippines. (2019). Grades, Fixer. Retrieved December 5, 2020, from https://gradesfixer.com/free-essay-examples/onion-production-in-the-philippines/

Onion Production Guide. https://businessdiary.com.ph/6051/onion-production-guide/ Retrieved December, 2019.

https://www.google.com/search?client=firefox-b-d&q=onion+production+in+the+Philippines, Retrieved 2020.