

## **BIBLIOGRAPHY**

BAGAYAO, CLIFFORD C. 2011. Effect of Planting Distance and Variety on the Production of Gourmet Potato. Benguet State University, La Trinidad, Benguet.

Adviser: Janet P. Pablo, MSc.

## **ABSTRACT**

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The performance of gourmet potato as affected by planting distance and variety was evaluated. It was observed that plants spaced closer at 10 cm x 10 cm and 15 cm x 15 cm were significantly the tallest and produced higher yield specially the small sized tuber.

Varieties had a significant effect on the growth and yield for the production of gourmet potatoes. Raniag registered the highest number and weight of marketable tubers and gourmet type potato and the tallest plants. However there was a significant reduction of growth and total yield of ganza.

A significant interaction of spacing and varieties were noted on plants spaced closer at 10 cm x 10 cm, 15 cm x 15 cm and Raniag had better growth performance and higher yield in terms of marketable and gourmet potato tubers. Plants spaced wider at 30 cm x 30 cm and using Ganza variety produced the lowest yield.

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## INTRODUCTION

The demand for small, gourmet, fresh market potatoes has increased in recent years. Production of small potatoes can be enhanced through management, although tuber size and number is not entirely under the grower's control. Producers wishing to grow for this specialty market can follow a production plan to produce small potatoes, or they can grade out the small tubers from a mixed size tuber lot. Several factors contribute to small tuber size. Gourmet potatoes may be small, but that doesn't mean they aren't practical – or full of flavor. In fact, their small size and unique shapes allow for faster cooking times and make them extra tasty and delicious (Delanoy, 2003).

During this time of the year marble size baby potatoes are usually available at most supermarkets for reason that there is a greater demand. Significant numbers of Pinoy prefer to use small and marble potatoes for their potato salad instead of the regular sized potatoes for better presentation. Young potatoes are also nuttier compared to the regular potatoes (Satanic et al., 2004).

Many experiments have demonstrated the influence of plant spacing on potato tuber yield and size, but little information is available on how spacing affects growth, and how plants compensate when grown close together or wide apart. Smaller daughter tubers are obtained by planting at a closer spacing, which increases competition between plants resulting in smaller daughter tubers (Vander et al., 1990).

The study aimed to:

1. determine the best variety of potato gourmet production;
2. determine the best distance for the production of potato gourmet production;



3. determine the interaction effect of the two potato varieties and the different planting distance; and

4. determine the profitability of growing potato for gourmet production.

The study was conducted at the BSU Experimental Station at Balili, La Trinidad, Benguet from May to August 2010.



## REVIEW OF LITERATURE

### Botanical Description

Potato varieties bear flower containing asexual parts. Flowers are mostly cross-pollinated by other potato plants, including by insects, but a substantial amount of self fertilizing occurs. Any potato variety can also be propagated vegetative by planting pieces of existing tubers, cut to include at least one eye. Some commercial varieties of potatoes do not produce seed at all (they bear imperfect, single-sex flowers) and are propagated only from tuber pieces. Confusingly, these pieces can bear the name “seed potatoes”. In French, potatoes are “pommes de Terre” – literally meaning apples of the earth (ATTRA, 2009).

After potato plants flower, some varieties will produce small green fruit that look similar to green cherry tomatoes. These produce seeds like other fruits. Each of the fruit can contain up to 300 true seeds. One can separate seeds from the fruits by putting them in a blender on a slow speed with some water, then leaving them in water for a day so that the seeds will sink and the rest of the fruit will float. However, some horticulturists sell chimeras by grafting a tomato plant into a potato plant, which can produce both edible tomatoes and potatoes (North Dakota State University, 1997).

When plants flower, you can harvest a few new potatoes from around the edge of each plant. New potatoes aren't just small potatoes they're immature spuds whose sugar hasn't yet converted to starch, as it has in fully developed tubers. That's why new potatoes are deliciously sweet and why they're best when used. There are several basic planting techniques, each with an infinite number of permutations. In row gardens, plants tuber or chunks 4 inches deep and 18 inches apart in rows 2 feet apart. If you'd prefer to plant in hills, mound as you would. You can also plant potatoes in compost piles or in soil-filled. Generally, the more space you gave the



plants to develop, the higher yields will be at harvest moderately after harvest (North Dakota State University, 1999).

### Gourmet

The demand for small, gourmet, fresh potatoes has increased in recent years. Production of small gourmet potatoes can be enhanced through management, although tuber size and number is not entirely under the grower's control. Producers wishing to grow for this specially market can follow a production plan to produce small potatoes, or they can grade out the small tubers from mixed sized tuber lot (Delanoy and Schaupmeyer, 2003).

Gourmet or small grade potatoes are of growing interest to certain markets around the world and in parts of the United States. Although small-sized potatoes could be sorted out of a regular potato harvest, cultural practices can be used to purposefully grow a higher percentage of smaller potatoes for this market (Manitoba Agriculture, Food and Rural Initiatives, 2004).

### Plant Spacing

Plant spacing closer than optimal plant spacing has a similar effect on tuber growth as does aged seed in that it increases tuber density relative to canopy size, thereby limiting the photosynthetic capacity to bulk each tuber. Although total yields may not be reduced, bulking rates of individual tubers decrease these results in smaller tubers and lower marketable yields. Wider than optimal spacing can lengthen the time it takes to reach full canopy, which reduces carbohydrate supply to the tubers (Dwelle, 1993).

Plant spacing is another management practice that has a large influence on the number and size of tubers per acre is in-row plan spacing. As seed pieces are spaced closer together, tuber size and numbers per plant typically decreases. However, because the seed pieces are



spaced closer together, the resulting total plant population per acre increases, and the overall tuber size and number per acre will also likely increase (Thornton, 2009).



## MATERIALS AND METHODS

### Land Preparation

An area of 150 m<sup>2</sup> was thoroughly prepared and divided into 24 plots. Each plot measures 1m x 5m. The experiment was laid-out using factor-factorial arranged in Randomized Complete Block Design (RCBD) with three replications.

The different treatments were as follows:

#### Factor A- (Variety)

V<sub>1</sub> = Raniag

V<sub>2</sub> = Ganza

#### Factor B- (Distance)

D<sub>1</sub> = 10x10 cm

D<sub>2</sub> = 15x15 cm

D<sub>3</sub> = 20x20 cm

D<sub>4</sub> = 25x25 cm

D<sub>5</sub> = 30x30 cm

### Cultural Management

One tuber per hill was planted in double rows using the different planting distances.

Crop protection such as weeding and spraying was done to ensure the good growth of the plants. Weeding was done during the early stage of growth of the plants.

All other recommended cultural management practices for potato were uniformly followed in all treatments.

The data gathered were:





## 1. Vegetative Characters

a. Percentage survival. This was the number of plants that survived, taken 30 days after planting and computed using the formula:

$$\% \text{ plant survival} = \frac{\text{No. of surviving plants}}{\text{Total number of plants}} \times 100$$

b. Initial and final height of potato (cm). Initial height was obtained by measuring the plants from the ground level to the tip of the tallest shoot at 45 days DAP and final height was obtained at maturity. Ten sample plants were selected at random and measured.

c. Plant vigor. This was taken every 30 days after planting (DAP) using the following scale:

<u>Scale</u>	<u>Remarks</u>
1	Very poor growth
2	Poor growth
3	Moderately vigorous
4	Vigorous
5	Highly vigorous

## 2. Yield and Yield Characters

a. Number weight of marketable tubers per plot (g). All tubers that have marketable size, not malformed, free from diseases and without more than 10% greening of the total surface were considered. The tubers were classified and weighed based on the following grades:

<u>Size</u>	<u>Grams</u>
Extra large tubers	96 g and above



Large tubers	66 to 95 g
Medium tubers	46 to 65 g
Small tubers	25 to 45 g
Marble tubers	less than 25 g

b. Number and weight of non-marketable tubers per plot (g). This was obtained by counting all tubers that were disease infested and had 10% or more greening.

c. Total yield per plot (g). This was computed by getting the sum of marketable and non-marketable tubers.

d. Computed yield (tons/ha). This was obtained by this formula:

$$\text{Computed yield (ton/ha)} = \frac{\text{Total yield/plot}}{\text{Plot size (m}^2\text{)}} \times 10,000 \text{ m}$$

### 3. Insect Pest and Diseases Incidence

a. Leaf miner incidence. This was taken 30, 45, 60 and 75 days after planting and was rated using the scale of 1-5 (CIP, 2001).

<u>Scale</u>	<u>Description</u>	<u>Remarks</u>
1	less than 20% of plants per plot affected	highly resistant
2	21-40% of plants per plot infested	moderately resistant
3	41-60% of plants per plot infested	susceptible
4	61-80% of plants per plot infested	moderately susceptible
<u>Scale</u>	<u>Description</u>	<u>Remarks</u>
5	81-100% of plants per plot infested	very susceptible



b. Late blight incidence. This was taken when the infestation of late blight was observed at the vegetative stage and harvesting period using the CIP (2001) rating scale:

<u>Blight (%)</u>	<u>Scale</u>	<u>Description</u>
0	1	no blight be seen
0.1	1	very few plants in larger plots with a lesion: not more than two lesions per 5m of row (+ 30 plants).
1	2	up to 10 small lesions per plants
3	3	up to 30 small lesions per plants or up to one leaflet on each 20 attacked.
10	4	most plants are visibly attacked, and one of three leaflets infected. Few multiple infections per leaflet.
25	5	nearly leaflet with lesions. Multiple infections per leaflet are common. Field or plot looks green, but all plants in plot are affected.
50	6	every plant affected and half the leaf destroyed by blight. Plots looks green, flecked and brown, blight is very obvious.
75	7	as previous, but three quarters of each plant affected by blight. Lower branches may be overwhelmingly killed off and only green if any, are at the top plant. Shape of plant
<u>Blight (%)</u>	<u>Scale</u>	<u>Description</u>
		maybe more spindly due to extensive foliar loss. Plots look neither higher brown nor green.



91	8	some leaves and most stems are green. Plots look brown with some green patches.
97	9	few green leaves most with lesions remain. Many stem lesions. Plots look brown.
100	10	All leaves and stems dead. No visible blight leaf to evaluate

Description: 1= highly resistant; 2-3= resistant; 4-5 = moderately resistant; 6-7 = modretely susceptible; 8-10 = susceptible

4. Return On Cash Expende (ROCE). This was computed using the following formula:

$$\text{ROCE} = \frac{\text{Gross sale} - \text{Total expenses}}{\text{Total expenses}} \times 100$$

#### Data Analysis

All quantitative data were analyzed using the analysis of variance (ANOVA) for Factor-factorial arranged in Randomized Complete Block Design (RCBD). The significance of difference among the treatment means was tested using the Duncan's Multiple Range Test (DMRT).



## RESULTS AND DISCUSSION

### Plant Survival

Effect of variety. Table 1 shows the percentage of the potato varieties as affected by planting distance. Significant differences were recorded on Raniag with the mean of 98.5% compared to Ganza with a mean of 96.1%.

Effect of planting distance. Results showed that the different planting distance did not significantly affect the plant survival among the treatment means. However, 25cm x 25 cm registered a hundred percent survival.

Interaction effect. No significant interaction was noted on the potato varieties and the different planting distance on plant survival.

### Plant Height

Effect of variety. Significant differences were observed on the plant height of the potato at 45 and 90 DAP. Raniag had significantly taller plants of 81.3 cm initial height and final height of 122.8 cm. The difference on the height of potato entries could be attributed to their genotypic traits.

Effect of distance. Significantly taller plants were observed on plants sown at a distance of 10 cm x 10 cm and 15 cm x 15 cm while the shortest plants were observed on plants sown at a distance of 30 cm x 30 cm at 45 and 90 DAP.

Table 1. Plant survival and height of the potato varieties as affected by planting distance for the production of gourmet potato

TREATMENT	PLANT SURVIVAL (%)	HEIGHT (cm)	
		45 DAP	90 DAP



<b>Variety</b>			
Raniag	98.50 <sup>a</sup>	81.30 <sup>a</sup>	122.80 <sup>a</sup>
Ganza	96.10 <sup>b</sup>	69.10 <sup>b</sup>	102.50 <sup>b</sup>
<b>Distance</b>			
10cm x 10cm	97.00	90.50 <sup>a</sup>	123.00 <sup>a</sup>
15cm x 15cm	96.30	88.50 <sup>a</sup>	121.60 <sup>a</sup>
20cm x 20cm	95.00	84.70 <sup>b</sup>	113.30 <sup>c</sup>
25cm x 25cm	100.00	62.70 <sup>c</sup>	108.50 <sup>c</sup>
30cm x 30cm	98.00	50.00 <sup>d</sup>	96.70 <sup>d</sup>
<b>V x D</b>	ns	*	*
<b>CV(%) A</b>	12.11	0.400	2.54
<b>B</b>	4.01	1.98	2.49

Interaction effect. The interaction effect of the potato variety and planting distance showed a significant difference on plant height at 45 and 90 DAP. The results may prove that planting at closer distances and enhances plant height as shown in Figures 1 and 2.

#### Number of Marketable Tubers

Effect of variety. The two varieties of potato used significantly affected the number of marketable tubers produced. The highest number of marketable tubers in all sizes were observed in Raniag with 32 XL, 41 large, 46 medium, 37 small, and 44 marble-sized tubers.



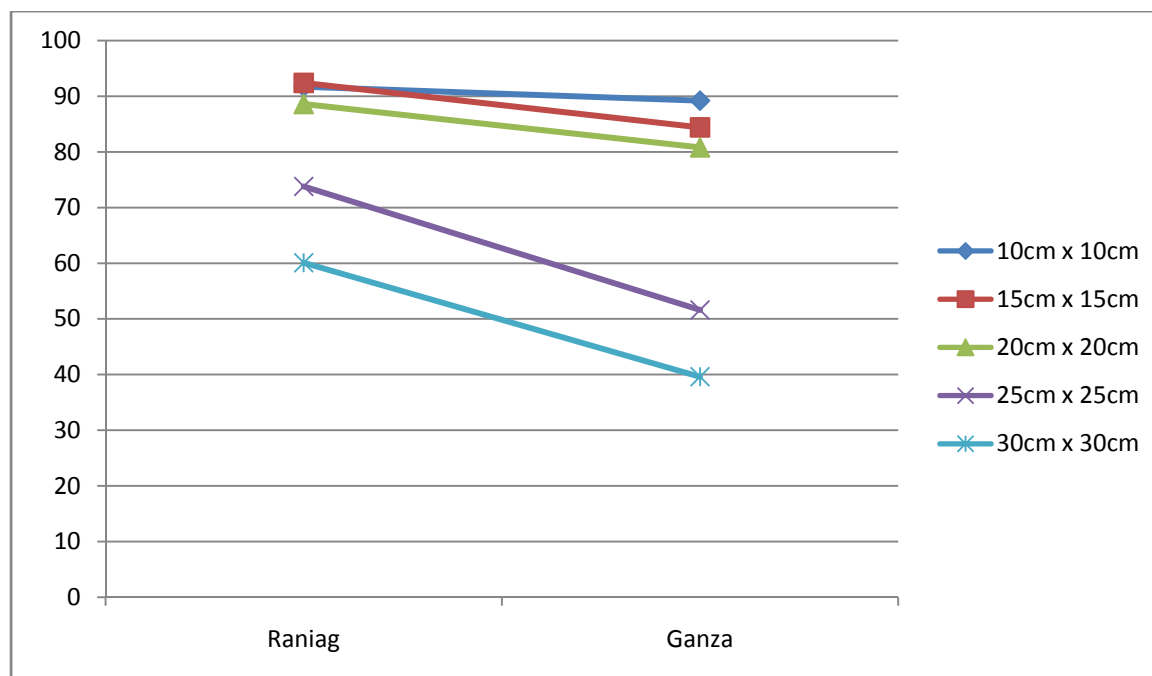


Figure 1. Interaction effect of the potato varieties and planting distance on the plant height at 45 DAP

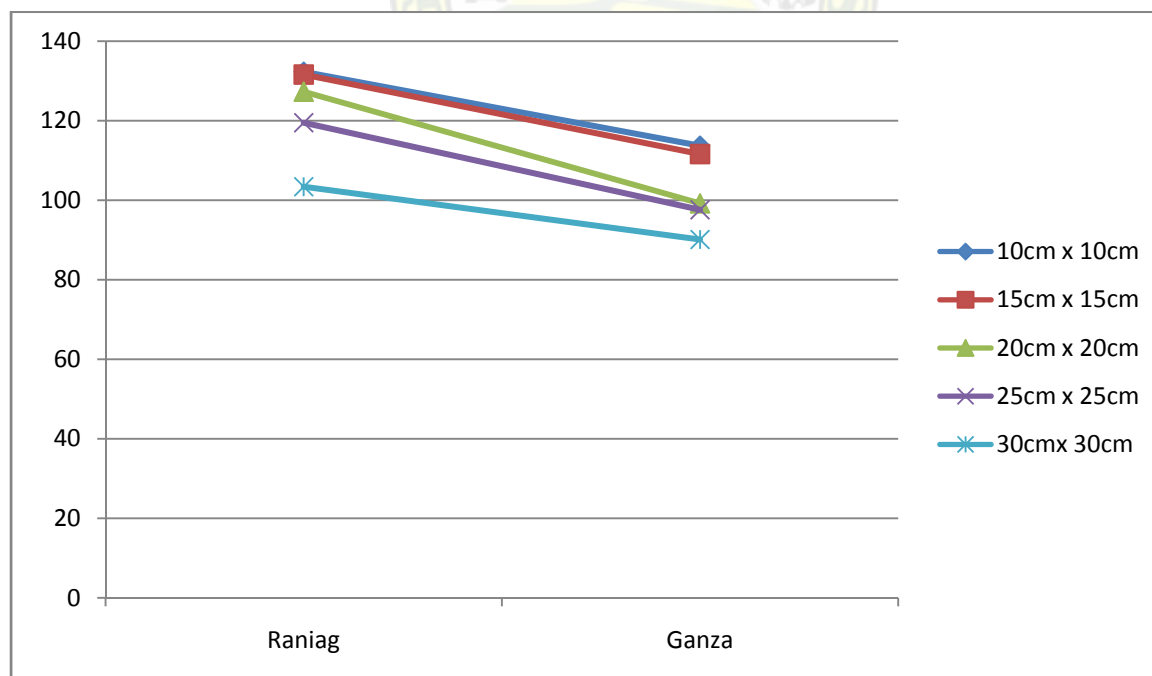


Figure 2. Interaction effect of the potato varieties and planting distance on the plant height at 90 DAP



Effect of distance. As shown in Table 2, the closer the distance, the higher the number of marketable tubers of various sizes were produced. Significantly highest number of tubers were recorded in plants distanced at 10 x 10 cm and 15 x 15 cm with 51 and 48 marble sized tubers produced, respectively. The lowest number of marketable tubers was noted in plants distanced at 25 cm x 25 cm and 30 cm x 30 cm of 24 and 19 marble sized tubers. As mentioned by Thornton (2009), seed pieces spaced close together results to increase in tuber number per acre.

Interaction Effect. Significant interaction effect was observed on the number of marketable tubers in all sizes (Figures 3a to d) except for the production of small sized tubers as affected by the planting distance. Raniag potato variety planted at a distance of 10 cm x 10 cm significantly produced the highest number of XL, L, M, and marble-sized tubers.

Table 2. Number of marketable tubers of the potato varieties as affected by planting distance for the production of gourmet potato

TREATMENT	NUMBER OF MARKETABLE TUBERS					TOTAL
	XL	LARGE	MEDIUM	SMALL	MARBLE	
Variety						
Raniag	31.00 <sup>a</sup>	41.00 <sup>a</sup>	45.70 <sup>a</sup>	37.00 <sup>a</sup>	44.00 <sup>a</sup>	199
Ganza	14.00 <sup>b</sup>	25.00 <sup>b</sup>	17.50 <sup>b</sup>	24.00 <sup>b</sup>	24.00 <sup>b</sup>	105
Distance						
10cm x 10cm	26 <sup>a</sup>	36.00 <sup>b</sup>	46.00 <sup>a</sup>	39.00 <sup>a</sup>	51.00 <sup>a</sup>	198
15cm x 15cm	30 <sup>a</sup>	53.00 <sup>a</sup>	34.00 <sup>b</sup>	23.00 <sup>b</sup>	47.00 <sup>a</sup>	187
20cm x 20cm	26 <sup>a</sup>	24.00 <sup>c</sup>	36.00 <sup>b</sup>	27.00 <sup>b</sup>	29.00 <sup>b</sup>	142
25cm x 25cm	17 <sup>b</sup>	25.00 <sup>c</sup>	19.00 <sup>c</sup>	23.00 <sup>b</sup>	24.00 <sup>bc</sup>	108
30cm x 30cm	14 <sup>b</sup>	27.00 <sup>bc</sup>	24.00 <sup>c</sup>	19.00 <sup>b</sup>	19.00 <sup>c</sup>	103
V x D	*	*	*	ns	*	
CV (%) A	29.11	24.42	36.99	13.27	23.13	
B	11.74	16.80	15.84	26.15	13.81	





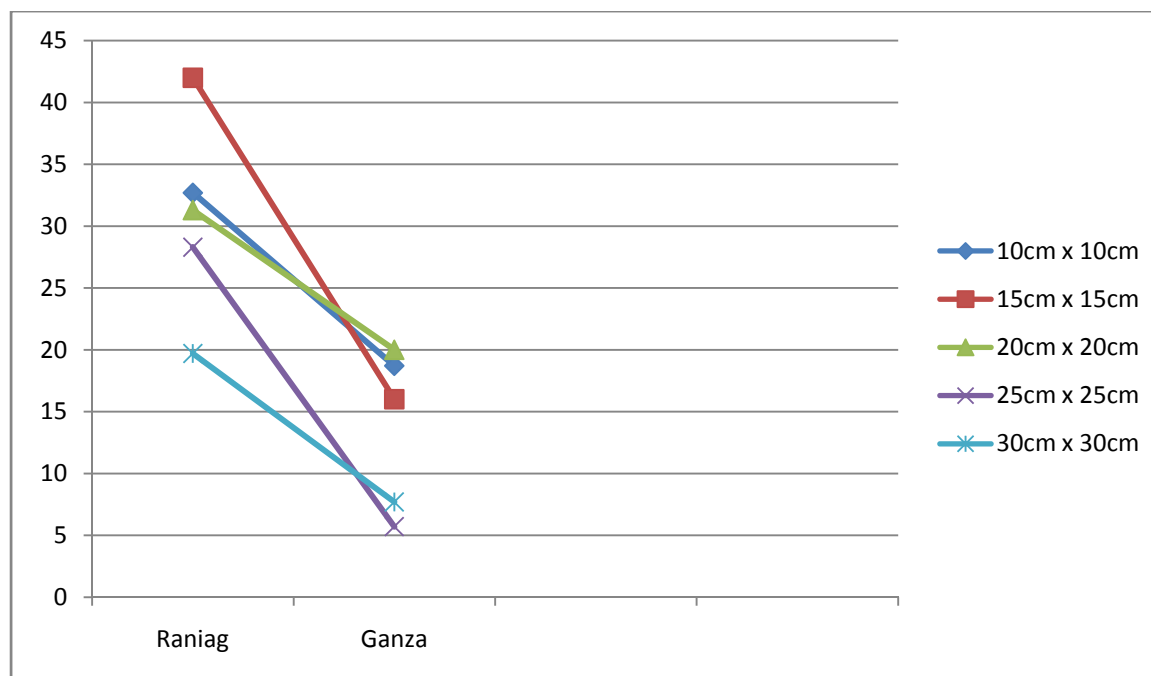


Figure 3a. Interaction effect of the potato varieties and planting distance on the number of extra large tubers.

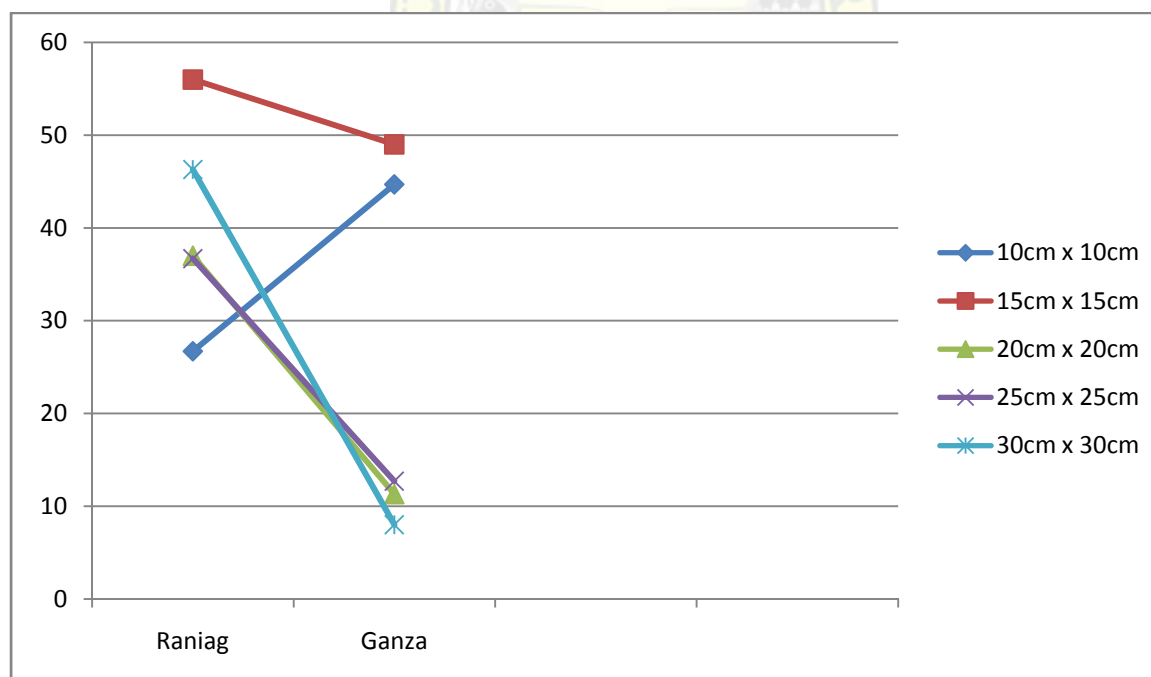


Figure 3b. Interaction effect of the potato varieties and planting distance on the number of large tubers



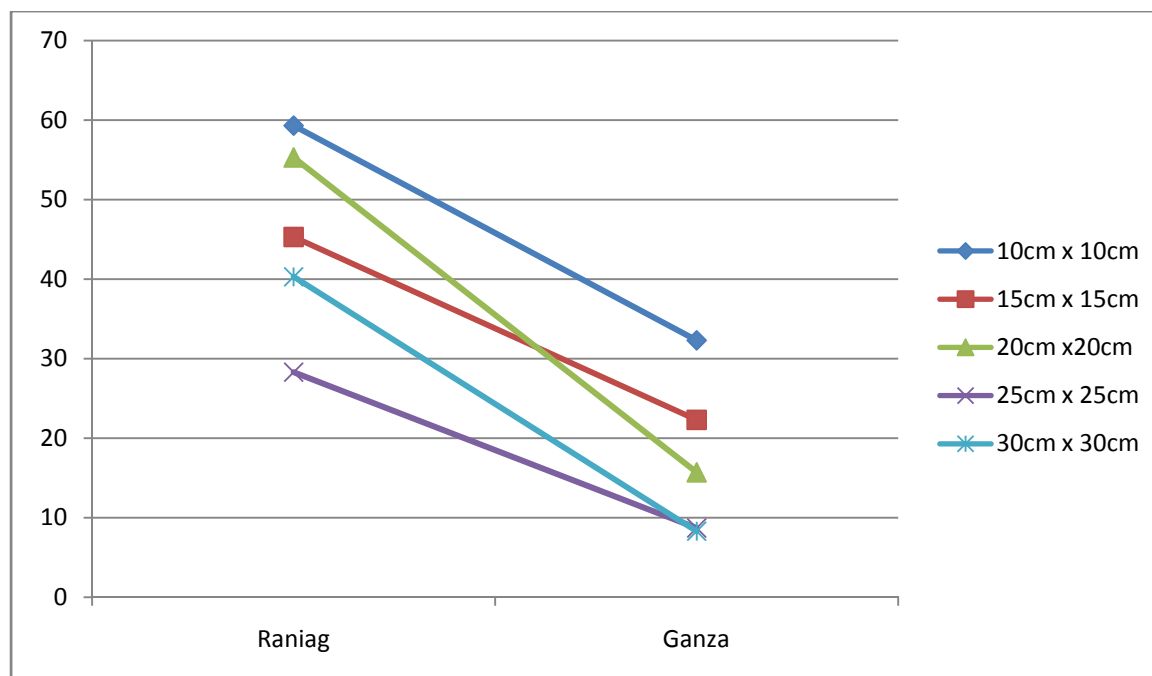


Figure 3c. Interaction effect of the potato varieties and planting distance on the number of medium tubers

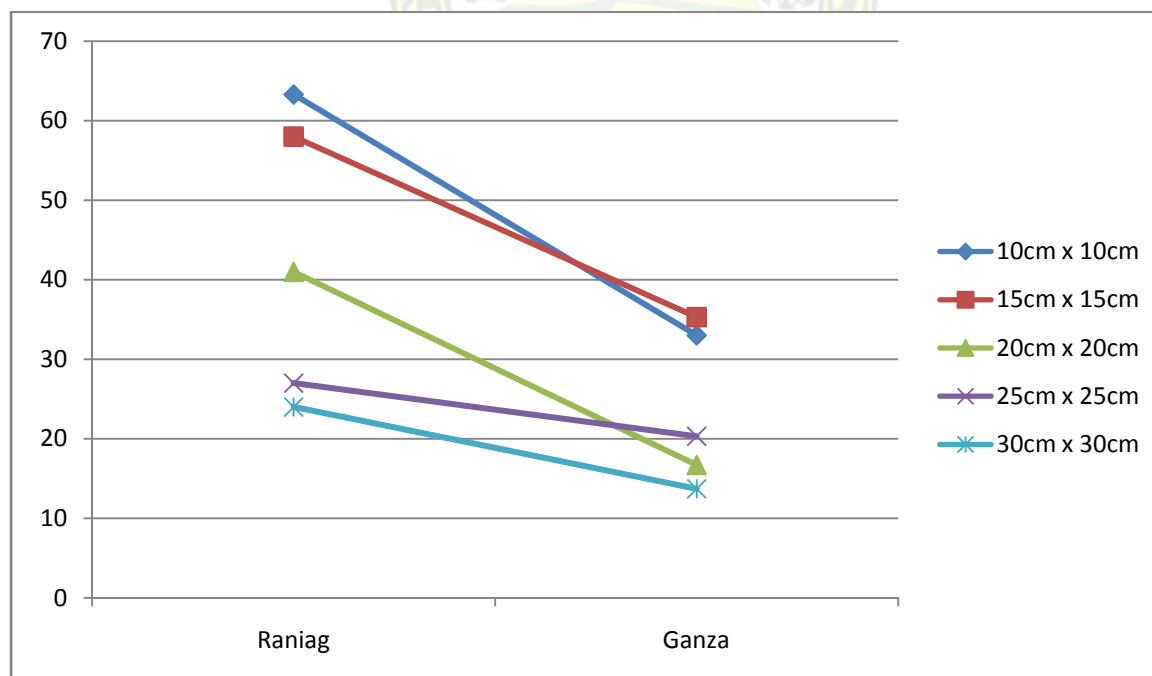


Figure 3d. Interaction effect of the potato varieties and planting distance on the number of marble tubers



### Weight of Marketable Tubers

Effect of variety. Results showed that significant differences were observed on the marketable weight of the potato at different sizes as shown in Table 3. Raniag significantly had the heaviest marketable tubers produced regardless of size with 3.0 kg of XL, 2.8 kg large, 2.0 kg of medium, 1.3 kg of small and 1.0kg marble sizes of potato. Gangza gave the lowest mean weight of marketable tubers produced.

Results also showed that the variety with the highest percent survival and highest number of marketable tubers had the heaviest weight of marketable tubers.

Effect of planting distance. The plants with a distance of 15cm x 15cm significantly produced the heaviest weight of tubers of XL and L sizes. The result is comparable with the plants distanced at 10cm x 10cm which significantly produced the heaviest weight of medium, small and marble-sized tubers. The low weight of marketable tubers was observed in plants distanced at 30cm x 30cm. According to Dwelle (1993), total yield may not be reduced but bulking rates of individual tubers decrease in smaller tubers and lower marketable tubers.

Interaction effect. The interaction of the potato variety and planting distance showed significant differences on the weight of marketable tubers on the production of XL, L and marble-sized tubers (Figure 4). No significant interaction effects were noted on the medium and small-sized tubers.

Planting distance of 15cm x 15cm significantly produced the heaviest weight of XL, medium, small and marble potato tubers.

The results imply that closer and higher planting densities increase the production of small and marble-sized tubers fitted for gourmet potato production.

Table 3. Weight of marketable tubers of the potato varieties as affected by planting distance for the production of gourmet potato.



TREATMENT	WEIGHT OF MARKETABLE TUBERS (kg/5m <sup>2</sup> )					
	XL	LARGE	MEDIUM	SMALL	MARBLE	TOTAL
Variety						
Raniag	3.00 <sup>a</sup>	2.80 <sup>a</sup>	2.00 <sup>a</sup>	1.30 <sup>a</sup>	1.00 <sup>a</sup>	10.10
Ganza	1.30 <sup>b</sup>	1.80 <sup>b</sup>	0.90 <sup>b</sup>	0.50 <sup>b</sup>	0.50 <sup>b</sup>	5.00
Distance						
10cm x 10cm	2.50 <sup>a</sup>	2.30 <sup>a</sup>	2.10 <sup>a</sup>	1.20 <sup>a</sup>	1.10 <sup>a</sup>	14.20
15cm x 15cm	2.80 <sup>a</sup>	3.60 <sup>a</sup>	1.70 <sup>a</sup>	0.90 <sup>b</sup>	1.0 <sup>0a</sup>	10.00
20cm x 20cm	2.60 <sup>a</sup>	1.70 <sup>b</sup>	1.70 <sup>a</sup>	0.90 <sup>b</sup>	0.60 <sup>b</sup>	7.50
25cm x 25cm	1.70 <sup>b</sup>	1.80 <sup>b</sup>	0.90 <sup>b</sup>	0.80 <sup>bc</sup>	0.50 <sup>bc</sup>	5.70
30cm x 30cm	1.40 <sup>c</sup>	2.10 <sup>b</sup>	1.00 <sup>b</sup>	0.60 <sup>c</sup>	0.40 <sup>c</sup>	5.50
V x D	*	*	ns	ns	*	
CV (%) A	41.18	14.62	13.14	26.06	8.01	
B	13.4	18.37	24.21	12.45	14.02	

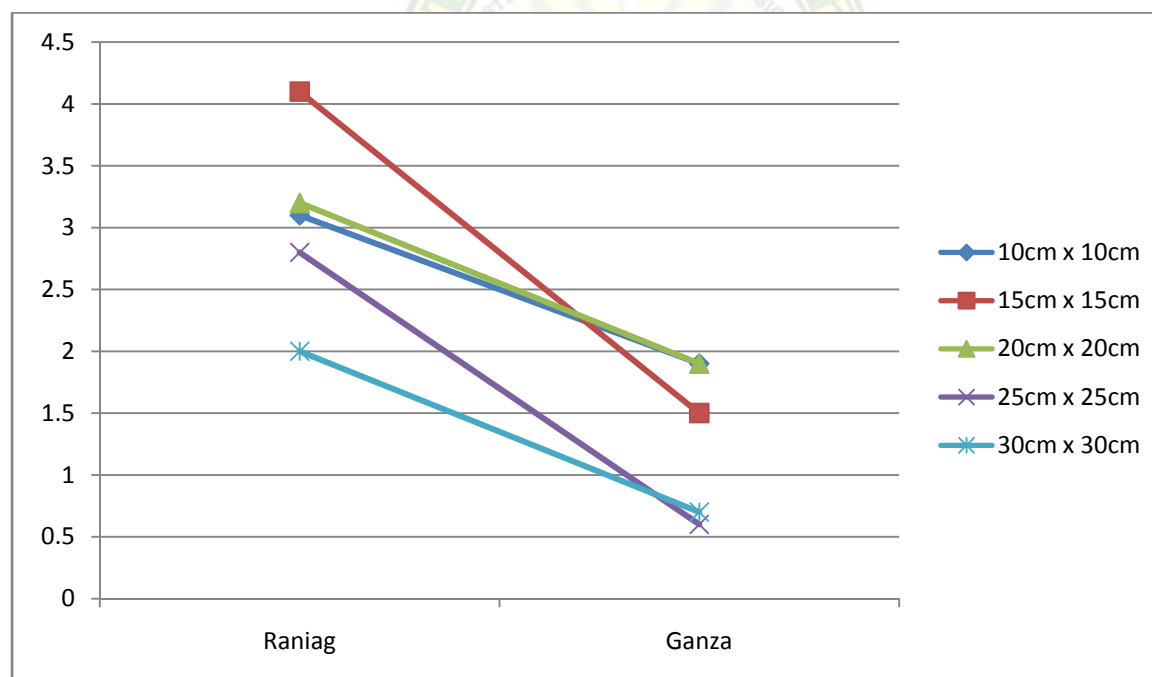


Figure 4a. Interaction effect of the potato varieties and planting distance on the weight of extra large tubers



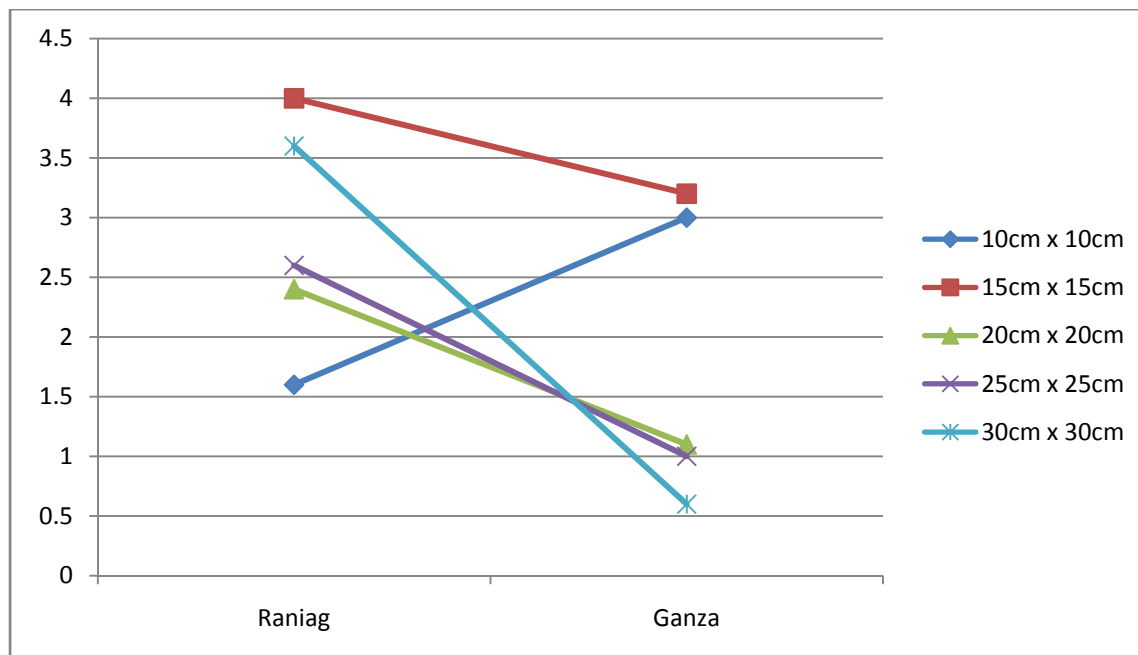


Figure 4b. Interaction effect of the potato varieties and planting distance on the weight of large tubers

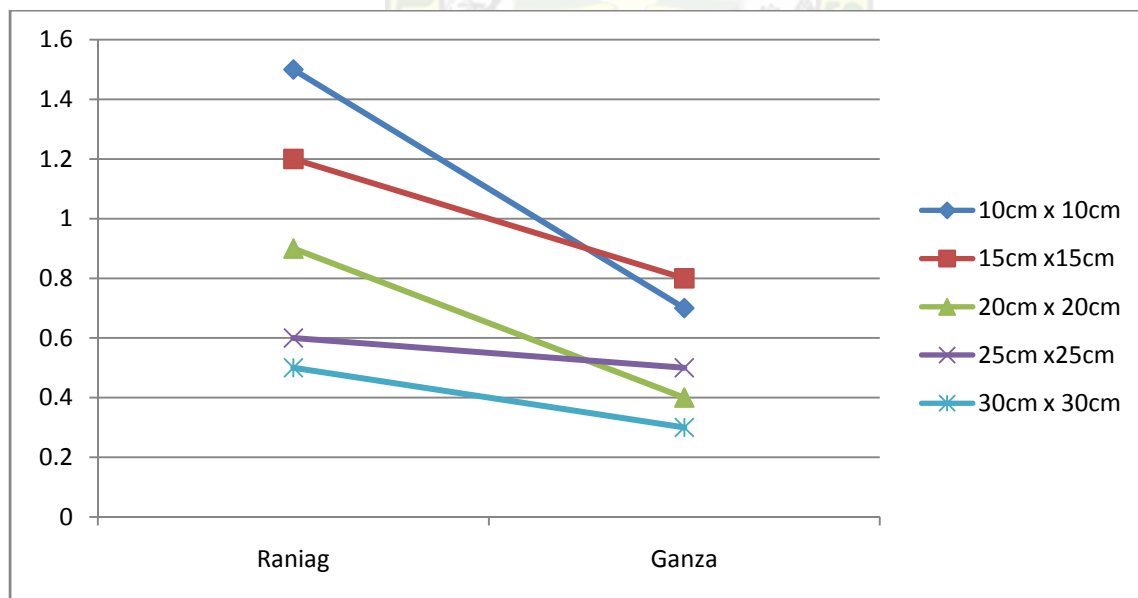


Figure 4c. Interaction effect of the potato varieties and planting distance on the weight of marble tubers

Number and Weight of Non-Marketable Tuber



Effect of variety. Table 4 showed a significant differences on the number and weight of non-marketable tubers of the potato varieties. Ganza significantly had the highest number and weight of non-marketable tubers with means of 22.0 and 1.6 respectively, while Raniag gave the lowest mean number and weight of non-marketable tubers of 6.0 and 0.4kg, respectively.

Effect of planting distance. No significant differences were noted on the number and weight of non-marketable tubers of potato as affected by the different planting distance.

Table 4. Number and weight of non- marketable tubers of the potato varieties as affected by planting distance for the production of gourmet potato

TREATMENT	NON-MARKETABLE TUBERS	
	NUMBER	WEIGHT (kg)
Variety		
Raniag	6.00 <sup>b</sup>	0.40 <sup>b</sup>
Ganza	22.00 <sup>a</sup>	1.60 <sup>a</sup>
Distance		
10 cm x 10 cm	16.00	1.20
15 cm x 15 cm	13.00	0.90
20 cm x 20 cm	15.00	1.20
25 cm x 25 cm	12.00	0.80
30 cm x 30 cm	15.00	1.00
VXD	ns	ns
CV (%)		
A	16.34	44.52
B	25.08	30.39

Interaction effect. The interaction effect of the potato varieties and planting distance showed no significant differences on the number and weight of non-marketable tubers.



### Total and Computed Yield

Effect of variety. Table 5 shows that significant differences were observed on the yield of the potato varieties. Raniag realized significantly the highest yield per 5m<sup>2</sup> of 10.6 kg. while Ganza gave the lowest mean of 6.6 kg. The computed yield of Raniag is almost twice (21kg.) that of Ganza (13.3 kg.)

Effect of planting distance. Significant differences were also noted on the total and computed yield. Planting distance at 15cm x 15cm significantly produced the highest total yield and computed yield comparable with the plants distanced at 10cm x 10cm. The lowest total yield and computed yield were observed in plants distanced at 30cm x 30cm and 25cm x 25cm.

Interaction effect. The interaction effect of the potato variety and planting distances showed significant differences on total and computed yield. Raniag significantly produced the highest total yield when planted at a distance of 10cm x 10cm and 15cm x 15cm (Figure 5). It was observed that as plant population is increased there is corresponding significant increase on the total yield per 5m<sup>2</sup> and computed yield.

The findings is supported by the statement of Hanai and Iruniyana (1974) which states that closer spacing for plants implies higher yield since there are more number of plants per unit area.

Table 5. Total and computed yield of the potato varieties as affected by planting distance for the production of gourmet potato

TREATMENT	TOTAL YIELD (kg/5m <sup>2</sup> )	COMPUTED YIELD (t/ha)
Variety		
Raniag	10.50 <sup>a</sup>	21.00 <sup>a</sup>
Ganza	6.60 <sup>b</sup>	13.30 <sup>b</sup>
Distances		
10 cm x 10 cm	10.30 <sup>a</sup>	20.50 <sup>a</sup>
15 cm x 15 cm	10.90 <sup>a</sup>	21.70 <sup>a</sup>



20 cm x 20 cm		8.60 <sup>b</sup>	17.10 <sup>b</sup>
25 cm x 25 cm		6.70 <sup>c</sup>	13.30 <sup>c</sup>
30 cm x 30 cm		5.60 <sup>c</sup>	13.10 <sup>c</sup>
VXD		*	*
CV (%)	A	10.59	10.29
	B	9.66	9.70

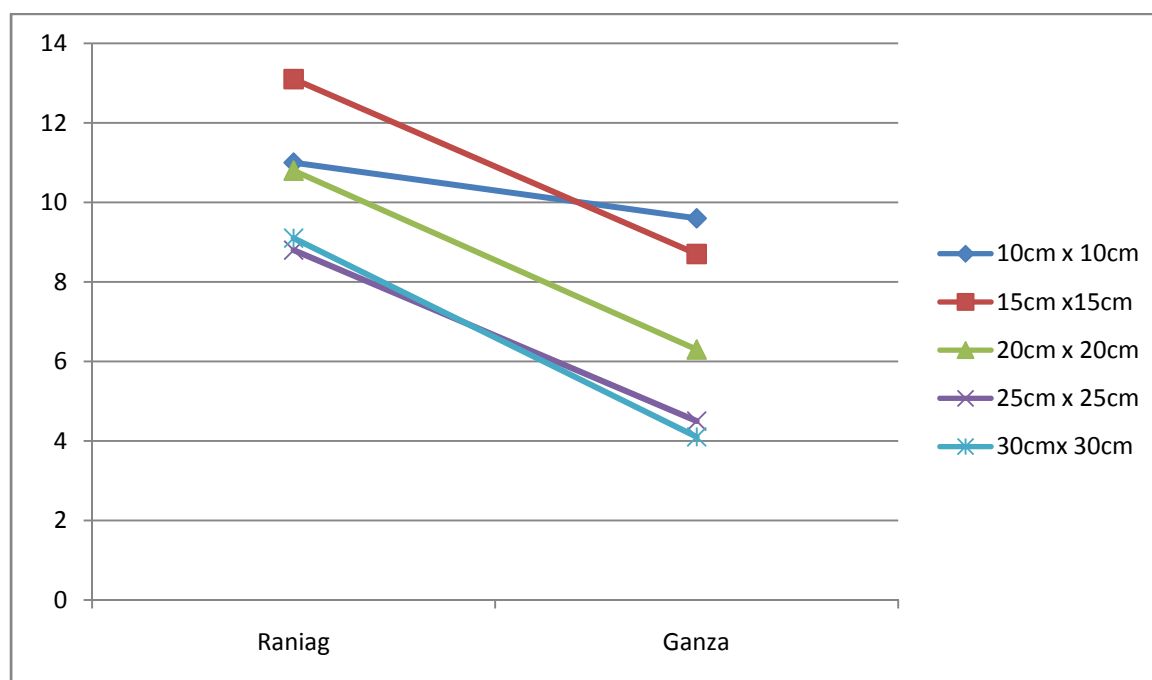


Figure 5. Interaction effect of the potato varieties and planting distance on the total yield

#### Reaction to Late Blight and Leaf Miner

All of the varieties planted at different distances showed high resistance to late blight and leaf miner with no blight seen.





Number and Weight and Total Yield of Small and Marble-sized Tuber for Gourmet Potato

Effect of variety. Table 6 shows that significant differences were observed on the number, weight and total yield of the potato varieties. Raniag realized the highest number and weight of small and marble-sized gourmet type potato. Ganza gave the lowest total yield of 1.1 kg/5m<sup>2</sup>.

Effect of planting distance. Significant differences were also noted on the number, weight and total yield of small and marble-sized gourmet type potato as affected by planting distances. Plants distanced at 10cm x 10cm and 15cm x 15cm significantly produced the highest number and total yield compared to the other planting distance. The lowest total yield was observed in plants distanced at 30cm x 30cm. The results prove that closer spacing between plants produce more gourmet type potatoes.

Interaction effect. The interaction effect of the potato variety and planting distances showed significant differences on number, weight and total yield of small and marble-sized gourmet type potato. Raniag significantly produced the highest total yield when planted at a distance of 10 cm x 10 cm and 15 cm x 15 cm.

Figure 6 shows that the number, weight and total yield of small and marble-sized gourmet type potato increase as planting distance decreased regardless of variety used.

Table 6. Number, weight and total yield of small and marble gourmet potato as affected by varieties and planting distance

TREATMENT	NUMBER		WEIGHT (Kg)		TOTAL YIELD (kg/5m <sup>2</sup> )
	SMALL	MARBLE	SMALL	MARBLE	



Variety					
Raniag	36.50 <sup>a</sup>	43.70 <sup>a</sup>	1.30 <sup>a</sup>	0.90 <sup>a</sup>	2.20 <sup>a</sup>
Ganza	15.70 <sup>b</sup>	23.80 <sup>b</sup>	0.50 <sup>b</sup>	0.50 <sup>b</sup>	1.10 <sup>b</sup>
Distance					
10 x 10 cm	38.80 <sup>a</sup>	50.70 <sup>a</sup>	1.20 <sup>a</sup>	1.20 <sup>a</sup>	2.40 <sup>a</sup>
15 x 15 cm	22.80 <sup>b</sup>	46.70 <sup>a</sup>	0.90 <sup>b</sup>	1.00 <sup>b</sup>	2.00 <sup>b</sup>
20 x 20 cm	26.80 <sup>b</sup>	28.80 <sup>b</sup>	0.90 <sup>b</sup>	0.60 <sup>b</sup>	1.50 <sup>c</sup>
25 x 25 cm	23.20 <sup>b</sup>	23.70 <sup>bc</sup>	0.80 <sup>bc</sup>	0.50 <sup>c</sup>	1.30 <sup>c</sup>
30 x 30 cm	18.80 <sup>b</sup>	18.80 <sup>c</sup>	0.60 <sup>c</sup>	0.40 <sup>c</sup>	1.10 <sup>d</sup>
VxD	ns	*	ns	*	**
CV (%)A	13.27	23.13	26.06	8.01	22.28
B	26.15	13.81	12.45	14.02	12.07

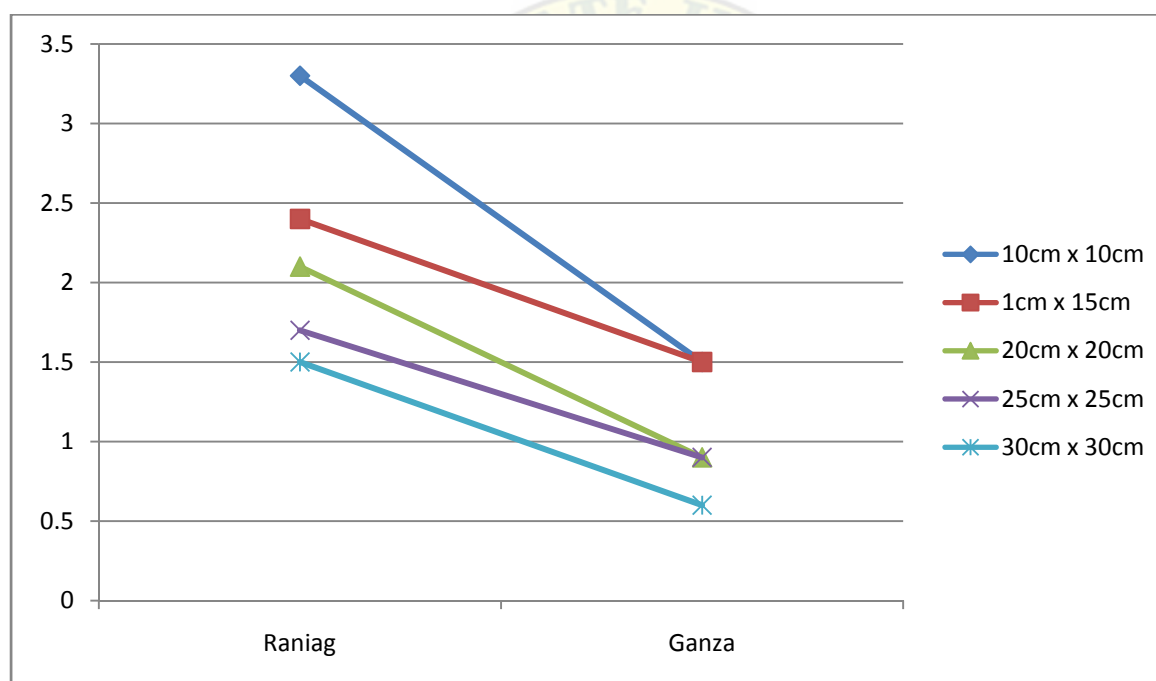


Figure 6. Interaction effect of the potato varieties and planting distance on the total yield of small and marble-sized gourmet potato

#### Return on Cash Expense (ROCE)

Raniag planted at a distance of 10cm x 10cm and 15cm x 15cm registered the highest ROCE (56% and 92%) while Ganza distanced at 30cm x 30cm had the highest negative ROCE



(Table 7). This implies that high ROCE is realized when Raniag is planted at closer distances. It was observed that higher number and weight of small and marble-sized tubers increase as planting distance decreases.

Table 7. Cost and return analysis for small and marble-sized tubers for gourmet potato production

TREATMENT	YIELD (kg/plot)	GROSS SALE (PhP)	COST OF PRODUCTION (PhP)	NET INCOME (PhP)	ROCE (%)
<b>Raniag</b>					
10 cm x 10 cm	3.2	160.00	62.50	97.50	156.00
15 cm x 15 cm	2.4	120.00	62.50	57.50	92.00
20 cm x 20 cm	2.2	110.00	62.50	47.50	76.00
25 cm x 25 cm	1.8	90.00	62.50	27.50	44.00
30 cm x 30 cm	1.5	75.00	62.50	12.50	20.00
<b>Ganza</b>					
10 cm x 10 cm	1.5	75.00	62.50	12.50	20.00
15 cm x 15 cm	1.5	75.00	62.50	12.50	20.00
20 cm x 20 cm	0.9	45.00	62.50	-17.50	-28.00
25 cm x 25 cm	0.9	45.00	62.50	-17.50	-28.00
30 cm x 30 cm	0.6	30.00	62.50	-32.50	-52.00

Cost of tubers is P50/kg



## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### Summary

The effect of the different planting distance on the production of gourmet potato was studied. The study aimed to determine the best variety of potato for gourmet production; determine the best distance for potato gourmet production; determine the effect of the potato varieties and the different planting distance; and to determine the profitability of growing potato for gourmet production.

The different planting distances used were: 10 cm x 10 cm, 15 cm x 15 cm, 20 cm x 20 cm, 25 cm x 25 cm and 30 cm x 30 cm while the potato varieties used were Raniag and Ganza.

Among the varieties used, Raniag had the highest plant survival, tallest plants at 45 and 90 DAP, produced the highest and heaviest marketable tubers, lowest non-marketable tubers, highest number and weight of small and marble tubers and realized the highest total and computed yield and ROCE.

On the effect of the different planting distance, plants distanced at 10 cm x 10 cm and 15 cm x 15 cm promoted the production of taller plants, produced the highest and heaviest marketable tubers, highest total and computed yield and realized the highest ROCE. The plant distanced at 10 cm x 10 cm produced the highest number and heaviest weight of gourmet potato.

Plants distanced at 15 cm x 15 cm gave the highest number and weight of extra large and large tubers while 10 cm x 10 cm plant distance results to the production of medium, small and marble tubers in terms of number and weight, thus, it is more suited for the production of gourmet-type potato tubers.

Significant interaction effects were noted between the two potato varieties and the different planting distance. Raniag variety at a distance of 15 cm x 15cm produced the highest



and heaviest XL and large marketable tubers while Raniag potato planted at a distance of 10 cm x 10 cm promoted the production of more gourmet type potato and highest ROCE.

No significant interaction effect were noted on plant survival, production of small number of marketable tuber, production of medium and small weight of marketable tuber

### Conclusions

Raniag is the best performing variety in the production of gourmet type potato as it produces the highest number and heaviest weight of marketable tubers, total and computed yield and produced the highest number and heaviest gourmet potato. Raniag also displayed the highest percent survival & tallest plants.

Potato plants distanced at 10cm x 10 cm and 15 cm x 15 cm produce the highest number and heaviest weight of gourmet type tubers.

Raniag variety with a plant distance of 10 cm x 10 cm and 15 cm x 15 cm showed the best performance in all parameters measured including the production of gourmet type potato.

### Recommendations

Under the conditions of the study, Raniag is the best variety for the production of gourmet potato. Plant distance of 10 cm x 10 cm and 15 cm x15 cm is also recommended. Further, it is recommended that the results of the study be extended to farmers interested to produce gourmet potato.



## LITERATURE CITED

- ATTRA. 2009. Commercial Potato Production and Management. Retrieved December 5, 2010 from <http://www.uky.edu/Ag/NewCrops/vegbudgets08>.
- DELANOY, L. 2003. Gourmet Potato Production. Retrieved January 17, 2010 from <http://www.ca.uky.edu/agcpubs/id/id134/id134.htm>
- DWELLE, R.B. Potato Health Management. Retrieved January 17, 2010 from <http://www.cals.uidaho.edu/potato/PotatoProductionSystems/Topics/Growth&Development.pdf>.
- INTERNATIONAL POTATO CENTER (CIP). 2001. Facts Sheet. Peru: CIP. 12 pages.
- MABREY, V. and D. APTON. 2008. From McMuffins to McLattes: McDonald's Chases Gourmet Market, Plans Massive Restaurant Upgrade. Retrieved January 25, 2010 from <http://twitter.com/gourmet>.
- MANITOBA AGRICULTURE, FOOD and RURAL INITIATIVES. 2004. Gourmet Potato Production. Retrieved February 4, 2010 from <http://www.gov.mb.ca/agriculture/cropspotato/bda0s10.html>
- NORTH DAKOTA STATE UNIVERSITY .1997. Fertilizing potato. Retrieved February 18, 2011 from <http://www.Ext.nodak.edu/extpubs/plantsci/soilfert/sf715w.htm>
- NOVELLI, M. 2004. Niche Tourism: Contemporary Issues, Trends and Cases. Retrieved February 20, 2010 from <http://www.uky.edu/Ag/NewCrops/vegbudget08.html>
- SATANEK, A., ROWELL, B., J. SNYDER, and D. SLONE. 2004. Gourmet and Fingerling Potato Cultivar Trial. Retrieved February 20, 2010 from [http://www.hort.purdue.edu/fruitveg/rep\\_pres/2004-/MVVT2004PDF/Potatoes\\_KY\\_04.pdf](http://www.hort.purdue.edu/fruitveg/rep_pres/2004-/MVVT2004PDF/Potatoes_KY_04.pdf)
- THORNTON, M. 2009. Potato research. Retrieved February 19, 2010 from <http://www.cals.uidaho.edu/potato/Research&Extension/Topic/Growth&Physiology/ImportanceOfTuberSet&BulkingRate-07.pdf>
- VENDER, W.H. and H. Veeman 1966. The potato. Retrieved January 19, 2010 from <http://www.oznet.ksu.edu/library/hort2/samplers/MF1090.asp>



## APPENDICES

Appendix Table 1. Plant survival (%)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	100	98	96	294	98.00
V <sub>1</sub> D <sub>2</sub>	100	97	94	291	97.00
V <sub>1</sub> D <sub>3</sub>	100	100	92	292	97.00
V <sub>1</sub> D <sub>4</sub>	100	100	100	300	100.00
V <sub>1</sub> D <sub>5</sub>	100	100	100	300	100.00
Sub-Total	500	495	482	1499	292
V <sub>2</sub> D <sub>1</sub>	100	96	92	288	96.00
V <sub>2</sub> D <sub>2</sub>	96	97	94	287	95.00
V <sub>2</sub> D <sub>3</sub>	94	100	84	278	92.00
V <sub>2</sub> D <sub>4</sub>	100	100	100	300	100.00
V <sub>2</sub> D <sub>5</sub>	88	100	100	288	96.00
Sub-Total	498	493	470	1441	480.00
TOTAL	978	988	952	2918	772.70
MEAN	97.8	98.8	95.2	29.18	77.27



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	98.00	96.00	194.00	97.00
15 x 15 cm	97.00	95.70	192.70	96.35
20 x 20 cm	97.30	92.70	190.00	95.00
25 x 25 cm	100.00	100.00	200.00	100.00
30 x 30 cm	100.00	96.00	196.00	98.00
TOTAL	292.30	480.40		
MEAN	58.46	96.08		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	69.067	34.533			
Main Factor A	1	43.200	43.200	4.32ns	18.51	98.49
Error (a)	2	20.000	10.000			
Sub-plot Factor B	4	84.533	21.133	1.39ns	3.01	4.77
AxB	4	22.133	5.533	0.36ns	3.01	4.77
Error (b)	16	264.933	15.183			
TOTAL	29	481.869				

<sup>ns</sup> - not significant

CV (%) = (a) = 12.11  
(b) = 4.01





Appendix Table 2. Initial height (cm)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	91.30	92.70	91.10	271.50	91.70
V <sub>1</sub> D <sub>2</sub>	90.90	94.10	92.10	277.10	92.40
V <sub>1</sub> D <sub>3</sub>	87.60	89.00	89.10	265.70	88.60
V <sub>1</sub> D <sub>4</sub>	72.60	74.20	74.60	221.40	93.80
V <sub>1</sub> D <sub>5</sub>	58.90	58.80	62.50	180.20	60.10
Sub-Total	401.30	408.80	409.90	1215.90	406.60
V <sub>2</sub> D <sub>1</sub>	87.80	89.40	90.50	267.70	89.20
V <sub>2</sub> D <sub>2</sub>	83.20	85.90	84.60	253.20	54.40
V <sub>2</sub> D <sub>3</sub>	82.00	81.00	79.30	242.30	80.80
V <sub>2</sub> D <sub>4</sub>	47.90	52.90	54.00	154.80	51.60
V <sub>2</sub> D <sub>5</sub>	39.40	39.50	39.00	177.90	39.60
Sub-Total	340.30	348.70	347.40	1096.20	345.60
TOTAL	741.60	757.50	757.30	2312.10	752.20
MEAN	741.60	75.75	75.73	231.21	75.22



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	91.70	89.20	180.90	90.45
15 x 15 cm	92.40	84.40	176.80	88.40
20 x 20 cm	88.60	80.80	169.40	84.70
25 x 25 cm	93.80	51.60	125.40	62.70
30 x 30 cm	60.10	39.60	99.70	49.85
TOTAL	406.60	345.60		
MEAN	81.32	69.12		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	16.145	8.072			
Main Factor A	1	1117.520	1117.520	123.71**	18.51	98.49
Error (a)	2	0.181	0.090			
Sub-plot Factor B	4	7836.261	1959.065	888.10**	3.01	4.77
AxB	4	460.268	115.067	52.20**	3.01	4.77
Error (b)	16	35.295	2.206			
TOTAL	29	9465.669				

\*\* - highly significant

CV (%) = (a) = 0.40  
(b) = 1.98



Appendix Table 3. Final height (cm)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	132.50	132.70	131.60	396.80	132.30
V <sub>1</sub> D <sub>2</sub>	131.40	131.00	132.50	394.90	131.60
V <sub>1</sub> D <sub>3</sub>	127.50	127.20	127.10	381.80	127.30
V <sub>1</sub> D <sub>4</sub>	112.60	123.60	122.20	358.40	119.50
V <sub>1</sub> D <sub>5</sub>	103.90	103.00	103.30	310.20	103.40
Sub-Total	607.90	615.50	616.70	1842.10	614.00
V <sub>2</sub> D <sub>1</sub>	113.80	112.50	114.80	341.10	113.70
V <sub>2</sub> D <sub>2</sub>	112.50	110.70	111.60	334.80	111.60
V <sub>2</sub> D <sub>3</sub>	99.30	100.00	98.40	297.70	99.20
V <sub>2</sub> D <sub>4</sub>	94.60	93.40	104.90	292.90	97.60
V <sub>2</sub> D <sub>5</sub>	89.90	88.80	91.70	270.40	90.10
Sub-Total	510.10	505.40	521.40	1536.90	512.30
TOTAL	1118	1122.90	1138.10	3382	1126.30
MEAN	111.80	112.29	113.81	33.82	112.63



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	132.30	113.70	246.00	123.00
15 x 15 cm	131.60	111.60	243.20	121.60
20 x 20 cm	127.30	99.20	226.50	113.25
25 x 25 cm	119.50	97.60	217.10	108.55
30 x 30 cm	103.40	90.10		
TOTAL	614.10	512.20		
MEAN	122.80	102.11		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	22.136	11.067			
Main Factor A	1	3106.936	3106.936	379.90	18.51	98.49
Error (a)	2	16.355	8.177	87.50**		
Sub-plot Factor B	4	2742.941	685.735	5.50**	3.01	4.77
AxB	4	171.325	42.831		3.01	4.77
Error (b)	16	125.449				
TOTAL	29	6185.142				

\*\* - highly significant

CV (%) = (a) = 0.40  
(b) = 1.98



Appendix Table 4. Number of extra large tubers

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	35	38	25	98	32.70
V <sub>1</sub> D <sub>2</sub>	46	50	30	126	42.00
V <sub>1</sub> D <sub>3</sub>	37	39	18	94	31.30
V <sub>1</sub> D <sub>4</sub>	31	35	19	85	28.30
V <sub>1</sub> D <sub>5</sub>	24	24	11	59	19.70
Sub-Total	173	186	103	462	154
V <sub>2</sub> D <sub>1</sub>	21	22	13	56	18.70
V <sub>2</sub> D <sub>2</sub>	20	18	10	48	16.00
V <sub>2</sub> D <sub>3</sub>	20	25	15	60	20.00
V <sub>2</sub> D <sub>4</sub>	4	7	6	17	5.70
V <sub>2</sub> D <sub>5</sub>	6	10	7	23	7.70
Sub-Total	74	82	51	207	69
TOTAL	180	268	154	602	223
MEAN	18.00	26.80	15.40	60.20	22.30



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	32.00	18.70	51.40	25.70
15 x 15 cm	42.00	16.00	58.00	29.00
20 x 20 cm	31.30	20.00	51.30	25.60
25 x 25 cm	28.30	5.70	34.00	17.00
30 x 30 cm	19.70	7.70	27.40	13.70
TOTAL	151.00	69.00		
MEAN	30.80	13.80		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	52.543	26.271			
Main Factor A	1	454.344	454.344	145.98	18.51	98.49
Error (a)	2	6.224	3.112			
Sub-plot Factor B	4	376.221	94.055	34.03**	3.01	4.77
AxB	4	52.714	13.178	4.77*	3.01	4.77
Error (b)	16	44.226	2.764			
TOTAL	29	986.272				

\*\* - highly significant

\* - significant

CV (%) = (a) = 10.29  
(b) = 9.70



Appendix Table 5. Number of large tubers

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	32	23	25	80	26.70
V <sub>1</sub> D <sub>2</sub>	70	51	47	168	56.00
V <sub>1</sub> D <sub>3</sub>	45	36	30	111	37.00
V <sub>1</sub> D <sub>4</sub>	44	31	35	110	36.70
V <sub>1</sub> D <sub>5</sub>	59	41	39	139	46.30
Sub-Total	25	182	176	608	202.70
V <sub>2</sub> D <sub>1</sub>	57	43	34	134	44.70
V <sub>2</sub> D <sub>2</sub>	59	47	41	147	49.00
V <sub>2</sub> D <sub>3</sub>	14	11	9	34	11.30
V <sub>2</sub> D <sub>4</sub>	10	13	15	38	12.70
V <sub>2</sub> D <sub>5</sub>	4	9	11	24	8.00
Sub-Total	139	123	110	377	125.70
TOTAL	38.90	30.50	28.60	98.50	32.83
MEAN	19.45	15.25	14.30	49.25	16.41



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	26.70	44.70	71.40	35.70
15 x 15 cm	56.00	49.00	105.00	52.50
20 x 20 cm	37.00	11.30	48.30	24.10
25 x 25 cm	36.70	12.70	49.40	24.70
30 x 30 cm	46.30	8.00	54.30	27.20
TOTAL	202.70	125.70		
MEAN	40.54	25.14		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	664.867	332.433			
Main Factor A	1	1778.700	1778.700	27.7*	18.51	98.49
Error (a)	2	128.600	64.300			
Sub-plot Factor B	4	3412.333	853.083	28.1**	3.01	4.77
AxB	4	2837.133	709.283	23.3**	3.01	4.77
Error (b)	16	486.533	30.408			
TOTAL	29	9308.167				

\*\* - highly significant

\* - significant

CV (%) = (a) = 24.42  
(b) = 16.80





Appendix Table 6. Number of medium tubers

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	80	51	47	178	59.30
V <sub>1</sub> D <sub>2</sub>	56	41	39	136	45.30
V <sub>1</sub> D <sub>3</sub>	65	53	48	166	55.30
V <sub>1</sub> D <sub>4</sub>	35	29	21	85	28.30
V <sub>1</sub> D <sub>5</sub>	48	40	33	121	40.30
Sub-Total	284	214	188	686	228.70
V <sub>2</sub> D <sub>1</sub>	41	30	26	97	32.30
V <sub>2</sub> D <sub>2</sub>	31	21	15	67	22.30
V <sub>2</sub> D <sub>3</sub>	14	18	15	47	15.70
V <sub>2</sub> D <sub>4</sub>	9	11	6	26	8.70
V <sub>2</sub> D <sub>5</sub>	5	13	7	25	8.30
Sub-Total	100	93	69	262	87.30
TOTAL	384	307	257	948	316
MEAN	38.40	30.70	25.70	94.8	31.60



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	59.30	32.30	91.60	45.80
15 x 15 cm	45.30	22.30	67.60	33.80
20 x 20 cm	55.30	15.70	71.00	35.50
25 x 25 cm	28.30	8.70	37.00	18.50
30 x 30 cm	40.30	8.30	48.00	24.30
TOTAL	228.50	87.30		
MEAN	45.70	43.65		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	818.600	409.300			
Main Factor A	1	5992.533	5992.533	43.9*	18.51	98.49
Error (a)	2	273.267	136.633			
Sub-plot Factor B	4	2683.200	670.800	26.8**	3.01	4.77
AxB	4	370.800	92.700	3.7*	3.01	4.77
Error (b)	16	400.800	25.050			
TOTAL	29	10539.200				

\*\* - highly significant

\* - significant

CV (%) = (a) = 36.99  
(b) = 15.84



Appendix Table 7. Number of small tubers

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	65	51	47	163	54.30
V <sub>1</sub> D <sub>2</sub>	42	33	35	80	26.70
V <sub>1</sub> D <sub>3</sub>	50	37	30	117	39.00
V <sub>1</sub> D <sub>4</sub>	41	29	33	103	34.30
V <sub>1</sub> D <sub>5</sub>	30	25	30	85	28.30
Sub-Total	228	175	175	578	192.70
V <sub>2</sub> D <sub>1</sub>	27	20	23	70	23.30
V <sub>2</sub> D <sub>2</sub>	20	16	21	57	19.00
V <sub>2</sub> D <sub>3</sub>	16	13	15	44	14.70
V <sub>2</sub> D <sub>4</sub>	12	11	13	36	12.00
V <sub>2</sub> D <sub>5</sub>	10	7	11	28	9.30
Sub-Total	85	67	83	235	78.30
TOTAL	313	240	258	813	271
MEAN	31.30	24.00	25.80	81.30	27.10



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	53.30	23.30	76.60	38.30
15 x 15 cm	26.70	19.00	45.70	22.90
20 x 20 cm	39.00	14.70	53.70	26.90
25 x 25 cm	34.30	12.00	46.30	23.20
30 x 30 cm	28.30	9.30	37.60	18.80
TOTAL	181.60	78.30		
MEAN	36.32	15.70		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	85.400	42.700			
Main Factor A	1	3265.633	3265.633	271.4**	18.51	98.49
Error (a)	2	24.067	12.033			
Sub-plot Factor B	4	1408.533	352.133	7.6**	3.01	4.77
AxB	4	441.867	110.467	2.4 <sup>ns</sup>	3.01	4.77
Error (b)	16	108.667	6.792			
TOTAL	29	5970.700				

\*\* - highly significant

<sup>ns</sup> - not significant

CV (%) = (a) = 13.29  
(b) = 26.15



Appendix Table 8. Number of marble tubers

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	79	67	59	205	63.30
V <sub>1</sub> D <sub>2</sub>	63	57	54	174	58.00
V <sub>1</sub> D <sub>3</sub>	54	39	30	123	41.00
V <sub>1</sub> D <sub>4</sub>	38	20	23	81	27.00
V <sub>1</sub> D <sub>5</sub>	31	23	18	72	24.00
Sub-Total	265	206	184	658	219.30
V <sub>2</sub> D <sub>1</sub>	40	38	21	99	33.00
V <sub>2</sub> D <sub>2</sub>	37	31	38	196	35.30
V <sub>2</sub> D <sub>3</sub>	24	19	7	50	16.70
V <sub>2</sub> D <sub>4</sub>	20	24	17	61	20.30
V <sub>2</sub> D <sub>5</sub>	17	13	11	41	13.70
Sub-Total	138	125	94	357	119
TOTAL	403	331	257	1015	338.30
MEAN	40.30	33.10	27.50	10.15	33.8316



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	63.30	33.00	96.30	48.10
15 x 15 cm	58.00	35.00	93.00	46.50
20 x 20 cm	41.00	16.70	57.70	28.85
25 x 25 cm	27.00	20.30	47.30	23.65
30 x 30 cm	24.00	13.70	37.70	18.85
TOTAL	213.30	118.70		
MEAN	42.66	23.72		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	787.267	393.633			
Main Factor A	1	2960.133	2960.133	49.8*	18.51	98.49
Error (a)	2	118.867	59.433			
Sub-plot Factor B	4	4808.200	1202.050	55.4**	3.01	4.77
AxB	4	798.200	199.550	9.2**	3.01	4.77
Error (b)	16	347.200	21.700			
TOTAL	29	9819.867				

\*\* - highly significant

\* - significant

CV (%) = (a) = 23.13  
(b) = 13.81



Appendix Table 9. Weight of extra large tubers (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	3.00	3.70	2.50	9.20	3.10
V <sub>1</sub> D <sub>2</sub>	4.50	4.90	2.90	12.20	4.10
V <sub>1</sub> D <sub>3</sub>	3.90	3.80	1.80	9.50	3.20
V <sub>1</sub> D <sub>4</sub>	3.10	3.40	1.90	8.40	2.80
V <sub>1</sub> D <sub>5</sub>	2.30	2.40	1.10	5.70	2.00
Sub-Total	16.80	18.20	10.20	45.20	15.20
V <sub>2</sub> D <sub>1</sub>	2.10	2.20	1.30	5.50	1.90
V <sub>2</sub> D <sub>2</sub>	1.90	1.80	1.00	4.60	1.50
V <sub>2</sub> D <sub>3</sub>	2.00	2.40	1.50	5.90	1.90
V <sub>2</sub> D <sub>4</sub>	0.50	0.70	0.60	1.80	0.60
V <sub>2</sub> D <sub>5</sub>	0.60	1.00	1.70	2.40	0.70
Sub-Total	7.10	8.10	5.10	20.30	6.80
TOTAL	23.90	26.30	15.30	65.70	22.00
MEAN	2.39	2.63	1.53	6.57	2.20



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	3.10	1.90	5.00	2.50
15 x 15 cm	4.10	1.50	5.60	2.80
20 x 20 cm	3.20	1.90	5.10	2.60
25 x 25 cm	2.80	0.60	3.40	1.70
30 x 30 cm	2.00	0.70	2.70	1.40
TOTAL	15.20	6.60		
MEAN	3.04	1.32		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	6.580				
Main Factor A	1	20.619	3.290		18.51	98.49
Error (a)	2	1.602	20.619	25.7*		
Sub-plot Factor B	4	9.189	0.801		3.01	4.77
AxB	4	2.558	2.297	26.8**	3.01	4.77
Error (b)	16	1.372	0.639	7.5**		
TOTAL	29	41.920	0.086			

\*\* - highly significant

\* - significant

CV (%) = (a) = 41.18  
(b) = 13.47





Appendix Table 10. Weight of large tubers (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	1.30	1.70	1.90	4.80	1.60
V <sub>1</sub> D <sub>2</sub>	4.10	3.50	4.20	11.80	4.00
V <sub>1</sub> D <sub>3</sub>	2.50	2.50	2.30	7.20	2.40
V <sub>1</sub> D <sub>4</sub>	2.50	2.00	3.40	7.90	2.60
V <sub>1</sub> D <sub>5</sub>	3.70	3.70	3.50	10.90	3.60
Sub-Total	14.10	13.40	15.30	42.80	14.00
V <sub>2</sub> D <sub>1</sub>	3.20	3.00	2.70	8.80	3.00
V <sub>2</sub> D <sub>2</sub>	3.40	3.30	3.10	1.00	3.20
V <sub>2</sub> D <sub>3</sub>	1.90	9.70	9.60	3.20	1.10
V <sub>2</sub> D <sub>4</sub>	0.60	1.20	1.40	3.10	1.10
V <sub>2</sub> D <sub>5</sub>	9.20	1.00	1.00	2.00	9.60
Sub-Total	9.30	9.20	8.80	18.10	6.00
TOTAL	13.40	22.60	24.10	60.90	20.30
MEAN	1.34	2.26	2.41	6.09	2.03



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	1.60	3.00	4.60	2.30
15 x 15 cm	4.00	3.20	7.20	3.60
20 x 20 cm	2.40	1.10	3.50	1.70
25 x 25 cm	2.60	1.00	3.60	1.80
30 x 30 cm	3.60	0.60		
TOTAL	14.20	8.90		
MEAN	2.84	1.78		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	0.150	0.075			
Main Factor A	1	8.421	8.421	73.4*	18.51	98.49
Error (a)	2	0.229	0.115			
Sub-plot Factor B	4	13.429	3.357	18.5**	3.01	4.77
AxB	4	14.994	3.749	20.8	3.01	4.77
Error (b)	16	400.800	25.050			
TOTAL	29	40.124				

\*\* - highly significant

\* - significant

CV (%) = (a) = 14.62  
(b) = 18.37



Appendix Table 11. Weight of medium tubers (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	2.70	2.50	2.30	8.00	2.70
V <sub>1</sub> D <sub>2</sub>	2.10	2.70	2.20	7.00	2.30
V <sub>1</sub> D <sub>3</sub>	2.60	2.10	2.40	7.10	2.40
V <sub>1</sub> D <sub>4</sub>	1.20	1.50	1.20	4.00	1.30
V <sub>1</sub> D <sub>5</sub>	0.50	2.40	1.80	4.70	1.60
Sub-Total	9.10	11.20	10.00	30.20	10.00
V <sub>2</sub> D <sub>1</sub>	1.50	1.80	1.40	4.70	1.60
V <sub>2</sub> D <sub>2</sub>	1.10	1.30	0.80	3.20	1.10
V <sub>2</sub> D <sub>3</sub>	1.00	1.00	0.90	2.80	0.90
V <sub>2</sub> D <sub>4</sub>	0.40	0.70	0.70	1.70	0.60
V <sub>2</sub> D <sub>5</sub>	0.20	0.80	0.40	1.40	0.50
Sub-Total	4.20	5.60	4.20	13.80	4.60
TOTAL	13.30	16.80	14.20	315.80	14.60
MEAN	1.31	1.68	1.42	31.58	1.46



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	2.70	1.60	4.30	2.15
15 x 15 cm	2.30	1.10	3.40	1.70
20 x 20 cm	2.40	0.90	3.30	1.60
25 x 25 cm	1.30	0.60	1.90	1.00
30 x 30 cm	1.60	0.50	2.10	1.05
TOTAL	10.30	4.70		
MEAN	2.06	0.94		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	0.591	0.296			
Main Factor A	1	9.442	9.442	244.1**	18.51	98.49
Error (a)	2	0.077	0.039			
Sub-plot Factor B	4	5.846	1.461	11.3**	3.01	4.77
AxB	4	0.387	0.097	0.75 <sup>ns</sup>	3.01	4.77
Error (b)	16	2.073	0.130			
TOTAL	29	18.416				

\*\* - highly significant

<sup>ns</sup> - not significant

CV (%) = (a) = 13.19  
(b) = 24.21



Appendix Table 12. Weight of small tubers (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	2.00	1.60	1.60	5.10	1.70
V <sub>1</sub> D <sub>2</sub>	1.30	1.10	1.20	3.60	1.20
V <sub>1</sub> D <sub>3</sub>	1.60	1.20	0.90	3.80	1.30
V <sub>1</sub> D <sub>4</sub>	1.20	1.10	1.10	3.50	1.20
V <sub>1</sub> D <sub>5</sub>	0.90	1.00	0.90	2.90	1.00
Sub-Total	7.00	6.00	5.70	18.70	6.20
V <sub>2</sub> D <sub>1</sub>	0.80	0.70	0.80	2.30	0.80
V <sub>2</sub> D <sub>2</sub>	0.70	0.60	0.70	2.00	0.70
V <sub>2</sub> D <sub>3</sub>	0.50	0.50	0.50	1.50	0.50
V <sub>2</sub> D <sub>4</sub>	0.40	0.40	0.50	1.30	0.40
V <sub>2</sub> D <sub>5</sub>	0.30	0.20	0.30	0.90	0.30
Sub-Total	2.70	2.40	2.80	8.00	2.70
TOTAL	9.70	8.40	5.50	23.60	8.90
MEAN	0.97	0.84	0.55	2.36	0.89



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	1.70	0.80	2.50	1.30
15 x 15 cm	1.20	0.70	1.90	1.00
20 x 20 cm	1.30	0.50	1.80	0.90
25 x 25 cm	1.20	0.40	1.60	0.80
30 x 30 cm	1.10	0.30	1.30	0.60
TOTAL	6.40	2.70		
MEAN	1.28	0.54		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	0.099	0.049			
Main Factor A	1	3.914	3.914	79.0*	18.51	98.49
Error (a)	2	0.099	0.050			
Sub-plot Factor B	4	1.198	0.300	24.3**	3.01	4.77
AxB	4	0.122	0.031	2.5 <sup>ns</sup>	3.01	4.77
Error (b)	16	0.197	0.012			
TOTAL	29	5.630				

\*\* - highly significant

<sup>ns</sup> - not significantCV (%) = (a) = 25.06  
(b) = 12.45

Appendix Table 13. Weight of marble tubers (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	1.80	1.50	1.20	4.50	1.50
V <sub>1</sub> D <sub>2</sub>	1.30	1.30	1.10	3.70	1.20
V <sub>1</sub> D <sub>3</sub>	1.10	0.80	0.60	2.60	0.90
V <sub>1</sub> D <sub>4</sub>	0.80	0.60	0.50	1.80	0.60
V <sub>1</sub> D <sub>5</sub>	0.70	0.80	0.40	1.60	0.50
Sub-Total	5.70	5.00	3.80	14.50	4.80
V <sub>2</sub> D <sub>1</sub>	0.90	0.70	0.40	2.20	0.70
V <sub>2</sub> D <sub>2</sub>	0.80	0.40	0.80	2.30	0.80
V <sub>2</sub> D <sub>3</sub>	0.50	0.60	0.30	1.10	0.40
V <sub>2</sub> D <sub>4</sub>	0.50	0.60	0.40	1.40	0.50
V <sub>2</sub> D <sub>5</sub>	0.40	0.30	0.30	1.00	0.30
Sub-Total	3.10	2.60	2.20	7.90	2.70
TOTAL	8.80	7.60	6.00	22.40	7.50
MEAN	0.88	0.76	0.60	2.24	0.75



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	1.50	0.70	2.20	1.10
15 x 15 cm	1.20	0.80	2.00	1.00
20 x 20 cm	0.90	0.40	1.30	0.70
25 x 25 cm	0.60	0.50	1.10	0.60
30 x 30 cm	0.50	0.30	0.80	0.40
TOTAL	4.70	2.70		
MEAN	0.94	0.54		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	0.427	0.214			
Main Factor A	1	1.313	1.313	72.4*	18.51	98.49
Error (a)	2	0.036	0.018			
Sub-plot Factor B	4	2.190	0.547	50.2**	3.01	4.77
AxB	4	0.387	0.097	8.8**	3.01	4.77
Error (b)	16	0.174	0.011			
TOTAL	29	4.527				

\*\* - highly significant

\* - significant

CV (%) = (a) = 8.01  
(b) = 14.02





Appendix Table 14. Number of marketable tubers

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	7	7	8	22	7.30
V <sub>1</sub> D <sub>2</sub>	5	6	5	16	5.30
V <sub>1</sub> D <sub>3</sub>	9	4	9	22	7.30
V <sub>1</sub> D <sub>4</sub>	3	7	3	13	4.30
V <sub>1</sub> D <sub>5</sub>	8	4	4	16	5.30
Sub-Total	32	28	28	89	29.70
V <sub>2</sub> D <sub>1</sub>	25	23	23	71	23.70
V <sub>2</sub> D <sub>2</sub>	18	27	15	60	20.00
V <sub>2</sub> D <sub>3</sub>	20	28	21	69	23.00
V <sub>2</sub> D <sub>4</sub>	17	20	22	59	20.00
V <sub>2</sub> D <sub>5</sub>	28	19	25	72	24.00
Sub-Total	108	117	106	331	110.70
TOTAL	140	145	135	420	140
MEAN	1.40	1.45	1.35	4.20	1.40



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	7.30	23.70	31.00	15.50
15 x 15 cm	5.30	20.00	25.30	12.60
20 x 20 cm	7.30	23.00	30.30	15.20
25 x 25 cm	4.30	20.00	24.30	12.20
30 x 30 cm	5.30	24.00	29.30	14.70
TOTAL	29.50	109.70		
MEAN	5.90	21.94		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	5.000	2.500			
Main Factor A	1	1952.133	1952.133	373.0**	18.51	98.49
Error (a)	2	10.467	5.233			
Sub-plot Factor B	4	59.000	14.750	1.2 <sup>ns</sup>	3.01	4.77
AxB	4	14.200	3.550	0.29 <sup>ns</sup>	3.01	4.77
Error (b)	16	197.200	12.325			
TOTAL	29	2238.000				

\*\* - highly significant

<sup>ns</sup> - not significant

CV (%) = (a) = 16.34  
(b) = 25.08



Appendix Table 15. Weight of non-marketable tubers (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	0.6	0.5	0.5	1.6	0.5
V <sub>1</sub> D <sub>2</sub>	0.5	0.5	0.3	1.3	0.4
V <sub>1</sub> D <sub>3</sub>	0.8	0.3	0.5	1.7	0.6
V <sub>1</sub> D <sub>4</sub>	0.3	0.4	0.2	1.0	0.3
V <sub>1</sub> D <sub>5</sub>	0.8	0.2	0.3	1.3	0.4
Sub-Total	3.0	2.0	1.8	6.8	2.3
V <sub>2</sub> D <sub>1</sub>	1.7	2.0	1.5	5.3	1.8
V <sub>2</sub> D <sub>2</sub>	1.4	1.6	1.0	4.1	1.4
V <sub>2</sub> D <sub>3</sub>	1.3	2.5	1.4	5.2	1.7
V <sub>2</sub> D <sub>4</sub>	1.0	1.8	1.3	4.1	1.4
V <sub>2</sub> D <sub>5</sub>	1.9	1.1	1.6	4.6	1.5
Sub-Total	7.3	9.0	6.8	23.1	7.7
TOTAL	10.3	11.0	8.6	29.9	10.0
MEAN	1.03	1.10	0.86	2.99	1.00



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	0.5	1.8	2.3	1.2
15 x 15 cm	0.4	1.4	1.8	0.9
20 x 20 cm	0.6	1.7	2.3	1.2
25 x 25 cm	0.3	1.4	1.7	0.8
30 x 30 cm	0.4	1.5	1.9	1.0
TOTAL	2.2	7.8		
MEAN	0.44	1.56		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	0.273	0.136			
Main Factor A	1	9.035	9.035	45.0*	18.51	98.49
Error (a)	2	0.402	0.201			
Sub-plot Factor B	4	0.496	0.124	1.32 <sup>ns</sup>	3.01	4.77
AxB	4	0.086	0.021	0.23 <sup>ns</sup>	3.01	4.77
Error (b)	16	1.498	0.094			
TOTAL	29	11.790				

\*\* - highly significant

<sup>ns</sup> - not significantCV (%) = (a) = 44.52  
(b) = 30.39

Appendix Table 16. Total yield/plot (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	11.3	11.5	10.0	32.8	11.0
V <sub>1</sub> D <sub>2</sub>	13.8	13.4	12.0	39.2	13.1
V <sub>1</sub> D <sub>3</sub>	12.4	11.4	8.5	32.4	10.8
V <sub>1</sub> D <sub>4</sub>	9.1	9.0	8.3	26.4	8.8
V <sub>1</sub> D <sub>5</sub>	8.8	10.3	8.1	27.2	9.1
Sub-Total	55.4	45.3	46.9	15.8	52.8
V <sub>2</sub> D <sub>1</sub>	10.2	10.4	8.2	28.8	9.6
V <sub>2</sub> D <sub>2</sub>	9.4	9.3	7.3	26.0	8.7
V <sub>2</sub> D <sub>3</sub>	6.4	7.6	5.0	19.0	6.3
V <sub>2</sub> D <sub>4</sub>	3.3	5.3	5.0	13.5	4.5
V <sub>2</sub> D <sub>5</sub>	3.7	4.2	4.3	12.2	4.1
Sub-Total	33.3	36.8	29.8	99.5	30.2
TOTAL	88.7	82.1	76.7	257.5	83.0
MEAN	8.87	8.21	7.67	25.75	8.3



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	11.0	9.6	20.6	10.3
15 x 15 cm	13.1	8.7	21.8	10.9
20 x 20 cm	10.8	6.3	17.1	8.5
25 x 25 cm	8.8	4.5	13.3	6.6
30 x 30 cm	9.1	4.1	13.2	6.6
TOTAL	52.8	33.2		
MEAN	10.56	6.64		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	13.217	6.609			
Main Factor A	1	114.169	114.169	138.4**	18.51	98.49
Error (a)	2	1.649	0.825			
Sub-plot Factor B	4	94.556	23.639	34.4**	3.01	4.77
AxB	4	12.790	3.197	4.6*	3.01	4.77
Error (b)	16	10.996				
TOTAL	29	247.376				

\*\* - highly significant

\* - significant

CV (%) = (a) = 10.59  
(b) = 6.66



Appendix Table 17. Computed yield (tons/ha)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	22.7	22.9	19.9	65.2	21.7
V <sub>1</sub> D <sub>2</sub>	27.6	26.7	24.0	48.4	26.1
V <sub>1</sub> D <sub>3</sub>	25.1	22.7	17.0	64.8	21.6
V <sub>1</sub> D <sub>4</sub>	18.3	18.1	16.6	52.9	17.6
V <sub>1</sub> D <sub>5</sub>	17.6	20.5	16.2	54.4	18.1
Sub-Total	111.3	110.9	97.3	315.9	125.3
V <sub>2</sub> D <sub>1</sub>	20.4	20.8	16.3	57.5	19.2
V <sub>2</sub> D <sub>2</sub>	18.7	18.5	14.7	51.9	17.3
V <sub>2</sub> D <sub>3</sub>	12.7	15.2	10.1	38.0	19.0
V <sub>2</sub> D <sub>4</sub>	6.7	10.5	9.8	27.0	9.0
V <sub>2</sub> D <sub>5</sub>	7.4	8.3	8.6	24.4	8.1
Sub-Total	66.0	73.3	60.0	198	66.3
TOTAL	177.3	184.2	153.7	514.0	171.6
MEAN	17.73	18.42	15.37	51.40	17.16



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	21.7	19.2	40.9	20.4
15 x 15 cm	26.1	17.3	43.4	21.7
20 x 20 cm	21.6	19.0	40.6	20.3
25 x 25 cm	17.6	9.0	28.6	14.3
30 x 30 cm	18.1	8.1	26.2	13.1
TOTAL	105.1	72.6		
MEAN	21.02	14.52		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	52.543	26.271			
Main Factor A	1	454.344	454.344	145.98	18.51	98.49
Error (a)	2	6.224	3.112			
Sub-plot Factor B	4	376.221	94.055	34.03**	3.01	4.77
AxB	4	52.714	13.178	4.7*	3.01	4.77
Error (b)	16	44.226	2.764			
TOTAL	29	986.272				

\*\* - highly significant

\* - significant

CV (%) = (a) = 10.29  
(b) = 9.70





Appendix Table 18. Total yield of small and marble size of gourmet potato tubers

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
V <sub>1</sub> D <sub>1</sub>	3.9	3.1	2.8	9.8	3.3
V <sub>1</sub> D <sub>2</sub>	2.6	2.4	2.3	7.3	2.4
V <sub>1</sub> D <sub>3</sub>	2.7	2.1	1.5	6.3	2.1
V <sub>1</sub> D <sub>4</sub>	2.0	1.6	1.6	5.2	1.7
V <sub>1</sub> D <sub>5</sub>	1.6	1.6	1.3	4.5	1.5
Sub-Total	12.8	10.8	9.5	32.2	11.0
V <sub>2</sub> D <sub>1</sub>	1.7	1.5	1.2	4.4	1.5
V <sub>2</sub> D <sub>2</sub>	1.6	1.3	1.5	4.4	1.5
V <sub>2</sub> D <sub>3</sub>	1.0	0.9	0.7	2.6	0.9
V <sub>2</sub> D <sub>4</sub>	0.9	1.0	0.9	2.8	0.9
V <sub>2</sub> D <sub>5</sub>	0.7	0.5	0.6	1.8	0.6
Sub-Total	5.9	5.2	4.9	16.0	5.3
TOTAL	18.7	16.0	14.4	48.2	16.3
MEAN	1.87	1.60	1.44	4.82	1.63



TWO WAY TABLE

PLANTING DISTANCE (cm)	VARIETY		TOTAL	MEAN
	RANIAG	GANZA		
10 x 10 cm	3.3	1.5	4.8	2.4
15 x 15 cm	2.4	1.5	3.9	2.0
20 x 20 cm	2.1	0.9	3.0	1.5
25 x 25 cm	1.7	0.9	2.6	1.3
30 x 30 cm	1.5	0.6	2.1	1.1
TOTAL	11	5.4		
MEAN	2.2	1.1		

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPUTED F	TABULATED F	
					0.05	0.01
Replication	2	0.945	0.472			
Main Factor A	1	9.747	9.747	73.2857**	18.51	98.49
Error (a)	2	0.266	0.133			
Sub-plot Factor B	4	6.545	1.636	42.4978**	3.01	4.77
AxB	4	0.971	0.243	6.3074**	3.01	4.77
Error (b)	16	0.616	0.039			
TOTAL	29	19.090				

\*\* - highly significant

CV (%) = (a) = 22.28  
(b) = 12.07

