BIBLIOGRAPHY

BALAS, MELBA B. APRIL 2006. Correlation of Morphological and Marketable Yield in Potato Genotypes (*Solanum tuberosum* L.) Grown Organically. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

Twenty potato genotypes were grown organically from May to August 2005. These genotypes were characterized morphologically and correlation analysis among the characters was done to determine the relationship among these characters and to identify the characters associated with marketable yield and harvest index.

The twenty potato genotypes showed variability for leaf, stem, root and tuber characters. Significant differences among the genotypes of all characters measured were observed.

Correlation between marketable yield and other characters showed that number of secondary stems, haulm weight, canopy cover at 75 DAP, diameter of stem and length of roots was significant. In the correlation between harvest index and the other characters, dry matter content of tubers and leaf area showed significant positive correlation. These characters that are significantly correlated with marketable yield and harvest index could be used as indices for selection of varieties or genotypes for organic production. Since morphological characters are difficult to assess and sometimes not reliable, a more

precise way to characterize is the use of DNA markers. Research towards DNA profiling could be done in the best potato genotypes for organic production.

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INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most important crops in the human diet around the world. It is a high value crop with lots of uses and efficient in utilizing farm space and time. It ranks first among the annually grown vegetables and one of the farmer's source of income in Benguet and some parts of Mountain Province. Aside from it's nutritive value, potatoes are also used as an industrial source of starch and animal feeds (HARRDEC, 1999).

In the Philippines, 74 % of the total potato production area come from Benguet and Mountain Province, while the remaining 26 % were from Southern and Northern parts of Mindanao (PCARRD, 1997).

According to researchers, potato farmers in Benguet and Mountain Provinces use tremendous amount of synthetic fertilizers and pesticides to increase their production. These practices, however, may lead to soil acidity and the decrease in the population of natural enemies. Another major effect is pollution of the soil, water and air which may cause health hazardous to people in the community. Considering these problems, organic potato production should be practiced.

According to Petzoldt (2005), organic production is termed by the practitioners as a method of production that uses practices or materials which are biologically enhancing to the soil, plants, animals and human consumers and producers. The principles of organic farming are to replenish and maintain long term fertility by providing the optimal conditions for biological activity, producing viable quantities of high quality and nutritious food, reducing the use of fuels and contamination of the environment that may result from farming. Encouraging the use of local resources and recycled nutrients, and also maintaining biodiversity that will minimize the occurrence of pest and diseases. Therefore, sustaining the land and a healthy conditions for future generations as well as optimizing the multiple use of the land will be attained.

In an organic farm, varieties should be resistant to pest and diseases. Thus, selection of varieties suitable in an organic farm is important. In selection of varieties, morphological characters are considered. These characters should be significantly correlated with yield to facilitate selection in an organic farm. At present, there are no available information in Benguet and Mountain Province to show correlation of characters with yield in an organic farm.

Before any correlation could be shown, morphological characterization should be done. Morphological characterization is done to identify morphotypes. A morphototyes is a group of plants showing morphological similarities, apparently of the same phenotype but not necessarily of the same genetic constitution (International Potato Center, 1997). Moreover, characterization is based on agro-morphological characters of the plants. Standardized descriptions are used to characterized materials in such a way that information exchange of genetic resources is more accessible to plant breeders and researchers. Breeders could use them as references for exploiting new traits that is desirable and related to yield of crop. Characters and traits should be identified to be correlated with yield and later, improvement could be done (Borromeo, *et al.*, 1994).

This study was conducted to characterize morphologically potato genotypes grown organically; and correlate morphological characters and marketable yield in potato genotypes grown organically.

The study was conducted at Benguet State University Experimental Station, Balili, La Trinidad Benguet from May to August 2005.

REVIEW OF LITERATURE

Organic Production and it's Importance

In the past years, farmers from different countries around the world were practicing the traditional method of farming to nurture the land and the environment. They managed their farms based on the dynamic interaction between the soil, plants, animals, humans and the environment (PCARRD, 2000). Organic production is the traditional method used by the farmers to practice the diverse farming which also avoided the use of synthetic chemical inputs (Briones, 1997 as cited by PCARRD, 2000).

Kuepper (2003) cited that organic farming is a system that works to mimic and optimize natural processes for the production of any crops. It utilizes a wide range of cultural practices and natural inputs to managed crops in such a way that they consider safe for the environment.

According to the National Organic Standards Board (NOSB), organic farming is an ecological production management system that promotes and enhances biodiversity and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony. Moreover, researchers on organic farms has revealed characteristics associated with farming such as reducing soil erosion, lowers fuel consumption, less leaching of nitrate and the prohibited use of synthetic pesticides and fertilizers (Kuepper and Gegner, 2004).

White (2004), stated that organic production is a food production system which relies on the use of crop residues, animal and green manures, legumes, crop rotation and biological pest control to maintain soil productivity, supply nutrient and to control insects, diseases and weeds.

In addition, organic production systems are based on specific and precise standards of production, which aim at achieving agro-ecosystems which are socially and ecologically sustainable. The use of composted material is environmentally friendly which results in the reduction of fertilizers for farmers. Compost is a cheaper source of fertilizer that contains all the nutrients that are needed by the potato plant. The use of animal manure completes the nutrient cycle allowing for a return of energy and fertilizer nutrients to the soil such as the manures from livestock feedlots, poultry operations and dairies. Implementing crop rotation in the farm creates diversity in space and time that disrupts the growth and development of weeds, pest and disease population just like when rotating from grain crops to a legume crops. Thus, the greater the differences between crops rotation sequence, the better cultural control of pest can be expected. Moreover, the uses of green manures and cover crops will protects the soil from excessive heat of the sun (Anonymous, 2001).

Kuepper and Gegner (2004), also indicated that farms with a diverse mix of crops. have a better chance of supporting beneficial organisms that assists in pollination and pest management. Diversity above ground also suggests diversity in the soil by providing better nutrient cycling, disease suppression, soil tilt, and nitrogen fixation.

Importance of Diversity and Selection

The development of an effective plant breeding program is dependent upon the existence of genetic variability. The efficiency of selection largely depends upon the magnitude of genetic variability present in the plant population. Therefore, the success of genetic improvement in any character depends on the nature of variability present in the gene pool for that character (Singh, and Narayanan, 1993).

The most important and vital phenomenon in any breeding program is understanding the genetic nature, and variability of the populations. The breeder should have working knowledge in the type and amount of genetic variation existing in the population. Gardner (1963), as cited by Jose (2004), stated that variations attributable to genetic differences, but also on the relationship among various quantitative traits is of fundamental significance in planning breeding programs.

Phenotypic and genotypic correlation and heritabilities are required to assess potential selection of potential parents carrying desired traits is frequently suggested for incorporation of physiological and morphological traits into new cultivars. How effectively the parent selection and normal agronomic evaluation approach incorporates the desired traits depend upon the heritability of the trait and its genetic correlation with yield (Hayward, *et al.*, 1993).

Boesen (1997) as cited by Gibson (2002), stated that selection of a suitable variety is an important step in the farm planning process but the availability of a large number of varieties makes the selection of variety for a given field. New varieties come and go in a steadily increasing amount and speed. Also there are many aspects and a lot of demands have to be taken into account before it is possible to make an opinion of which one of the available varieties in the market will probably be most suited for growing in the coming season. Some of these factors are yield, quality, agronomic characteristics, susceptibility, climate, soil type, pests, marketing conditions, settlings, helper substances and availability and price of planting materials.

Morphological Characters Associated
with Potato Yield Performance

Gibson (2002), found out that the leaf, stem, and seed tuber characters were significantly correlated. These relationships may help in understanding the physiological responses of different potato genotypes which eventually lead to better selection in different environments.

In a study conducted by Smith (1968) as cited by Gayadon (1999) results show that the larger the stems, the greater the assimilation rate per unit plant and the higher yield, therefore, the development number of many stems and leaf area per unit ground are important factors in potato production.

In 1992, Golmirzaie cited that root length and hypocotyl length had a significant correlation with the number of potato tubers per plant. MAF (1972) as cited by Gayadon (1999) found out that the yield of potato had been shown experimentally to be related to the number of stems per unit area planted. Marketable yield will increase as the number of stems increases up to the optimum density after it will fall as increasing competition prevents the development of individual tubers to acceptable size.

Morphological Characters Associated
with Yield in Other Crops

Sweet Potato. In a study conducted by Rebujio (2003) with twenty sweet potato genotypes, diversity analysis shows low variation for qualitative characters and high variation for quantitative characters. This indicates that selection should be for quantitative characters of sweet potato.

In 1981, Bacusmo as cited by Anselmo (1992) identified the following characters such as leaf area development, crop growth rate, leaf angle of young vine, internode length, number of roots per plants, and root mean weight as determinants to high yield. Likewise, Degras (1962) as cited by Anselmo (1992) established the combined effects of the following parameters of yielding ability like leaf area, leaf weight, petiole weight, leaf length/petiole length, and leaf area x density. Moreover, morphological and yield characters associated with yield under drought stress of sweet potato maybe used as selection index in breeding for drought resistance. These results suggest that canopy cover and harvest index are important parameters to be considered in selection.

Results on the study conducted by Shagol (2001), showed that there is no strong association found between the morphological characters and yield but the ten varieties were variable in morphological characters. The growth and yield performance of the sweet potato varieties depended on their genetic constitution and the environment where they were grown.

Corn. Based on the study conducted by Lomadeo (2005), there was positive and significant correlation coefficient of yield to other characters like leaf length, leaf width and leaf area. These characters could be used as selection indices when selecting for high yielding varieties of corn.

Remoquillo (2003) cited that a number of characters might influence productivity of tropical maize. This relevance might be assesed by the separate development of these traits from elite materials previously selected from desirable agronomic traits. Further evaluation of those desirable traits into one plant type requires information on genetic variability, genetic correlations between traits and their heritabilities. The combined inputs of breeders and physiologist in obtaining needed information and in continued selection of these traits should enhance the breeding processes for increasing yield.

Snap bean. PCARRD (1989) as cited by Shagol (2001), showed that the number of branches on snap beans is an important factors contributing to yield. Theoretically, the more branches, the greater the yield, the position or orientation of branches is also an important morphological characteristic. The upright or vertical position is considered ideal because it enables to intercept more sunlight necessary in photosynthesis. Gonzales (1983) also observed that bean plants with highest number of trifoliate leaves gave the highest yield.

Jose (2004) found out that there was a significant differences among the varieties characterized and evaluated. It was revealed that variability exist in terms of almost all the parameters measured. There was significant correlation among the characters measured in bean varieties such as days from emergence to harvesting, internode length, number of branches to pod width which indicates that they can be used a selection index for associated character and yield.

MATERIALS AND METHODS

Background of the experimental area

The experimental area was not applied with synthetic fertilizers for two consecutives years. In the first year of cultivation, it was planted with corn and the land was followed for three months and again planted with legumes. After legumes, the land was followed for seven months.

Land preparation and layout of the experimental area

An area of 225 m^2 was thoroughly prepared and further divided into three blocks. Each block was subdivided into 15 plots measuring 1 m X 5 m representing fifteen treatments. The experiment was laid-out following the randomize complete block design (RCBD) with three replications.

Preparation of planting materials and planting

Twenty potato accessions grown from rooted stem cutting were acquired from Northern Philippines Root Crop Research and Training Center (NPRCRTC). Rooted stem cuttings were planted using 30 cuttings per treatments/replication with a distance of 25 cm x 30 cm between hills and rows.

Cultural management practices

The treatments were equally applied with compost at a rate of 10 kg/5 m^2. Cultural practices such as irrigation and weeding were uniformly employed in all the treatments. There was no spraying of pesticides, instead yellow plastics traps was used for leaf miner control. The area was surrounded with corn and marigold to encourage diversity and reduce pest population.

Characterization

Characterization was done on the different accessions based on agro-morphological characters using the descriptors list for potato by the International Potato Center (CIP, 1977).

Treatments

The genotypes represent the treatments as follows:

GENOTYPES	SOURCE/ORIGIN
384558.10	CIP, Peru
380251.17	CIP, Peru
IP84007.67	CIP, Peru
285411.22	CIP, Peru
676070	CIP, Peru
387443.22	CIP, Peru
387039.15	CIP, Peru
676008	CIP, Peru
387410.7	CIP, Peru
575003	CIP, Peru
15.97.8	CIP, Peru
720045	CIP, Peru
676004	CIP, Peru
720071	CIP, Peru
285378.27	CIP, Peru
720097	CIP, Peru
676103	CIP, Peru
FS1	Philippines
Igorota	Philippines
Ganza	CIP, Peru

The data gathered were the following:

1. Meteorological data. The record of average rainfall, relative humidity, temperature and sunshine duration during the conduct of the study were taken from BSU-PAGASA Station.

2. Soil Chemical Properties. Soil samples were taken before the establishment of the experimental area and right after harvest to determine the present organic matter, pH, nitrogen, phosphorus, and potassium content of the soil. Soil samples were brought to the Bureau of Soils, Pacdal, Baguio City.

3. Canopy cover. Canopy cover was gathered at 30, 45, 65, 75 DAP by using a wooden frame of 120 x 60 cm having equally sized 12 x 6 cm grids. Holding the grids over the foliage of four representative previously marked plants, grids covered with effective leaves were counted.

4. Initial height. This was measured from the base of the plant up to the shoot of ten sample plants per plot using a meter stick at 30 DAP.

5. Plant height. Height was measured from the base of the plant up to the shoot of ten sample plants per plot using a meter stick at 90 DAP.

6. Growth habit type. This was taken by describing the type of growth habit at the beginning of flowering using the rating scale as follows:

SCALE	DESCRIPTION
1	Erect
2	Semi-erect
3	Decumbent, when the stems trail on the ground but arise at apex
4	Prostate, when the stems trail on the ground
5	Semi-prostate

6	Rosette, when all or most leaves are arranged at the base of the stem close to the soil surface

7. Branching habit. This was determined by visual observation using the rating scale as follows:

SCALE	DESCRIPTION
1	Single
2	Branched

8. Leaf characters. These characters were gathered from ten samples per plot at 60 DAP.

a. Foliage. The overall color of the foliage was recorded based on a color chart.

SCALE	DESCRIPTION
3	Light green
5	Intermediate
7	Dark green

b. Leaf dissection. This was obtained by describing the degree of leaf dissection using the following scale:

SCALE	DESCRIPTION
1	Undissected
2	Pinnatilobed
3	Scarcely dissected
4	Weakly dissected
5	Medium dissected
6	Strongly dissected
7	Very strongly dissected
8	Other

c. Abaxial leaf pubescence. The degree to which the lower surfaces of the leaves which are covered by hairs (trichomes), was describe using the scale as follows:

SCALE	DESCRIPTION
0	Glabrous
1	Glabrescent
2	Pubescent
3	Strongly pubescent

d. Adaxial leaf pubescence. The degree to which the upper surfaces of the leaves were determined are covered by hairs (trichomes), using the scale as follows:

SCALE	DESCRIPTION
0	Glabrous
1	Glabrescent
2	Pubescent
3	Strongly pubescent

e. Type of hairs (trichomes). This describes the type of hairs on the lower surface of the leaves using the rating scale as follows:

SCALE	DESCRIPTION
0	Absent
1	Simple
2	Simple and glandular (bearing a sticky four lobed head)
3	Simple and glandular (with a sticky droplet at the tip)
4	Simple and glandular (simple trichomes and both types of glandular trichomes present)
5	Other

f. Leaf area (cm^2). This was taken by tracing the leaves of the sample plants on a graphing paper. The squares covered were counted to be divided by four.

g. Number of leaves. This was taken by counting the number of leaves of the sample plants.

9. Stem characters. These were obtained by gathering ten sample plants per plot at 65 DAP.

a. Stem color. The color of the stem was obtained using the following rating scale:

SCALE	DESCRIPTION
0	Green only
1	Red brown only
2	Purple only
3	Cream with some red brown
4	Cream with purple
5	Red-brown with some green
6	Purple with some green
7	Other

b. Stem cross section. The shape of the stem in transverse section was obtained using the rating scale as follows:

SCALE	DESCRIPTION
1	Round
2	Angular

c. Stem wing. The presence of shape of the stem wing was recorded using the following scale:

SCALE	DESCRIPTION
1	Absent
2	Straight
3	Undulate
4	Dentate

d. Length of main stem (cm). This was measured from the base of the plant to the tip of the main stem using a meter stick.

e. Diameter of the stem (mm). This was gathered by measuring the diameter of the mid-portion of the main stem using a vernier caliper.

f. Length of the internode (cm). This was recorded by getting the means of the length of three internodes at the mid-portion of the sample plants.

g. Number of nodes. This was obtained by counting the number of the nodes from the base of the plants to the tip of the main stem.

h. Number of secondary stems. This was obtained by counting the secondary stems of the sample plants.

10. Presence/absence of flower. This was determined by visual observation.

11. Root characters. These characters were gathered from ten sample plants per plot at 90 DAP.

a. Number of roots. This was recorded by counting the numbers of roots of the sample plants.

b. Length of roots (cm). This was recorded by getting the means of the length of three roots of the sample plants using a ruler.

12. Tuber characters. These characters were gathered from ten sample plants per plot at 90 DAP.

a. Predominant tuber skin color. The color which covers most of the surface of the tuber was determined using the following rating scale:

SCALE	DESCRIPTION
1	White-cream
2	Yellow
3	Orange
4	Brownish
5	Pink
6	Red
7	Purplish-red
8	Purple

b. Tuber shape. The shape of the tuber was obtained using the following rating scale:

SCALE	DESCRIPTION
1	Compressed (oblate)
2	Round
3	Ovate
4	Obovate
5	Elliptic
6	Oblong
7	Elongate

c. Number of eyes per tuber. This was obtained by getting the means of the number of eyes of three tubers of the sample tubers.

d. Depth of eyes. This was described using the descriptors list a follows.

SCALE	DESCRIPTION
1	Protruding
2	Shallow
5	Medium

7	Deep
3	Very deep

e. Predominant tuber flesh color. This was described by visual observation of the flesh color present in most of the tubers using the rating scale as follows:

SCALE	DESCRIPTION
1	White
2	Cream
3	Yellow cream
4	Yellow
5	Red
6	Violet
7	Purple
8	Other
5	Broad vascular ring
6	Vascular ring and medulla (pith)
7	All flesh except medulla (pith)
8	Other

13. Tuber yield parameters. These were gathered from ten sample plants per plot at 90 DAP.

a. Weight of marketable tubers (g). This was recorded by weighing the tubers that are marketable size, not malformed, free from damages caused by insect pest and diseases.

b. Weight of non-marketable tubers (g). This was gathered by weighing the tubers that are marble size, malformed and damaged by insects and pests.

c. Total weight of tubers (g). This was obtained by gathering the total number of marketable and non-marketable tubers per plant.

d. Haulm Weight (g). The haulm weight was obtained after separating the roots and tuber at harvest.

14. Dry matter content (DMC) of tubers. This was recorded by obtaining the dry matter content of tubers using the following formula:

$$\% \text{ MC} = \frac{\text{Fresh weight- Oven dry weight}}{\text{Fresh weight}} \text{ X } 100$$

DMC = 100 % - % MC

15. Harvest Index (HI). This was recorded by getting the ratio of the economic yield using the following formula:

$$\% \text{ HI} = \frac{\text{TDW}}{\text{LDW+SDW+RDW+TDW}} \text{ X } 100$$

Where: TDW= Tuber dry weight
LDW= Leaf dry weight
SDW= Stem dry weight
RDW= Root dry weight

Analysis of Data

Data were statistically analyzed using analysis of variance (ANOVA) for randomized complete block design (RCBD). Significance of difference between treatments means were tested using the Duncan's Multiple Range Test (DMRT) at five percent level of probability. Correlation analysis was also done.

Correlation coefficient is a statistical measure which is used to find out the degree and direction of relationship between two or more variables. It helps in determining the yield contributing characters in plant breeding (Singh, and Narayanan, 1993).

According to Downie and Health (1983), the degree of relationship between two variables can be measured using the Pearson Product Moment (ρxy) coefficient which characterizes the interdependence of X and Y. The coefficient ρxy is a parameter which can be estimated from sample data using the formula:

$$r = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left(\sum x^2 - \frac{(\sum x)^2}{n}\right)\left(\sum y^2 - \frac{(\sum y)^2}{n}\right)}}$$

RESULTS AND DISCUSSION

Meteorological Data During the Study Period

Air temperature, relative humidity, rainfall and total sunshine from May to July, 2005 are presented in Table 1. Minimum air temperature ranged from 16-20.4^{o}C while maximum air temperature is from 24-27 ^{o}C with a mean of 21.43 ^{o}C. Mean relative humidity is 79.4 % while rainfall amount recorded is 19.68 mm, respectively. Total sunshine ranged from 30 to 498 cm with a mean of 266.4 cm.

According to HARRDEC (1996), potato grows best in areas with temperature ranging from 17.22 ^{o}C and average relative humidity of 86 %. High light intensity and short day length elevates the optimum temperature for potato tuberization while lower light intensity enhances the effect of long day length delaying tuberization and promoting canopy growth. According to PCARRD (1982), rainfall of about 2.5 cm per week, evenly distributed throughout the growing season is considered adequate. Since the rainfall amount was high from May 22 to June 5, the optimum yield of the potatoes may be affected.

Table 1. Meteorological data during the study period

MONTHS	AIR TEMPERATURE (^{o}C)		RELATIVE HUMIDITY (%)	RAINFALL AMOUNT (mm)	TOTAL SUNSHINE (kj)
	MIN	MAX			
May 6 to 21	16.0	24.5	69	9.4	348
May 22 to June 5	17.5	24.0	59	60.5	318
June 6 to 20	30.4	27.0	96	0	498
June 21 to July 5	16.2	24.5	86	18.3	30
July 6 to July 20	18.7	25.5	87	10.2	138
MEAN	21.43		79.40	19.68	266.40

Soil Analysis of the Experimental Area

Table 2 shows the soil analysis of the experimental area before planting and after harvest. Before planting, the pH is 4.98 and organic matter is 2.5. After harvest, the pH increased to 5.2 while OM is the same. The initial nitrogen, phosphorous and potassium content are 0.13 %, 155 ppm and 306 ppm, respectively. After harvest, nitrogen content remained the same while P_2O_5 and K_2O_5 had increased.

Growth Habit Type

Table 3 shows the growth habit type of potato genotypes at the beginning of flowering. As presented, Ganza and 285378.27 registered an erect growth habit, genotype 676103 have a prostate growth habit, genotypes 720071, 15.97.8, 387039.15, 387443.22, 285411.22 and IP84004.67 have a decumbent growth while the other genotypes have a semi-erect growth habit type.

Branching Habit

The branching habit of the potato genotypes is shown in Table 3. All the genotypes have two or more branches except for genotypes Ganza, FS1, 676103 and 15.97.8 which have single branch.

Table 2. Initial and final soil analysis of the experimental area

	pH	OM (%)	N (%)	P_2O_5 (ppm)	K_2O_5 (ppm)
Before Planting	4.98	2.5	0.13	155	306
After Harvest	5.32	2.5	0.13	430	316

Table 3. Growth and branching habit of twenty potato genotypes

GENOTYPE	GROWTH HABIT TYPE	BRANCHING HABIT
384558.10	Semi-erect	Branched
380251.17	Semi-erect	Branched
IP84007.67	Decumbent	Branched
285411.22	Decumbent	Branched
676070	Semi-erect	Branched
387443.22	Decumbent	Branched
387039.15	Decumbent	Branched
676008	Semi-erect	Branched
387410.7	Semi-erect	Branched
575003	Semi-erect	Branched
15.97.8	Decumbent	Single
720045	Semi-erect	Branched
676004	Semi-erect	Branched
720071	Decumbent	Branched
285378.27	Erect	Branched
720097	Semi-erect	Branched
676103	Prostate	Single
FS1	Semi-erect	Single
Igorota	Semi-erect	Branched
Ganza	Erect	Single

Canopy Cover

The canopy cover of the potato genotypes are shown in Table 4. Significant differences were observed among the genotypes for canopy cover at 30, 45, 65 and 75 DAP. At 30 DAP, genotype 384558.10 had the highest canopy cover which is comparable with 387039.15 while genotypes 376004 and FS1 had the lowest canopy cover.

At 45 DAP, genotypes 384558.10 and 380251.17 had the highest canopy cover. On the other hand, genotype 720097 had the lowest canopy cover. At 65 DAP, genotype 380251.17 had the highest canopy cover which was not significantly different with 387039.15 but is comparable with genotype 384558.10. Genotype 720045 on the other hand produced the lowest canopy cover.

At 75 DAP, genotypes 384558.10 and 380251.17 had the highest canopy cover at 45 and 65 DAP.

The results showed that genotypes 384558.10 and 380251.17 consistently showed the high canopy covers in all dates. Canopy cover obtained may not be reliable at the later stages of growth since plants were damaged with late blight and some plants were infected with bacterial wilt.

Table 4. Canopy cover of twenty potato genotypes at 30, 45, 65 and 75 DAP

GENOTYPE	CANOPY COVER* (DAP)			
	30	45	65	75
384558.10	43.00[a]	56.00[a]	51.00[ab]	51.00[abc]
380251.17	29.00[abcd]	50.33[a]	55.33[a]	58.00[a]
IP84007.67	22.00[bcd]	27.33[bcde]	49.00[abc]	50.67[abc]
285411.22	24.00[bcd]	36.00[abcde]	43.50[abcde]	52.00[ab]
676070	26.00[bcd]	38.67[abcd]	44.50[abcde]	33.50[bcdefg]
387443.22	24.67[bcd]	41.67[abc]	46.00[abcd]	35.67[bcdef]
387039.15	35.33[ab]	40.33[abc]	54.67[a]	51.33[ab]
676008	19.00[cd]	28.00[bcde]	38.67[abcdef]	34.00[bcdefg]
387410.7	18.67[cd]	27.00[bcde]	20.00[ef]	15.00[fg]
575003	19.00[cd]	18.33[de]	27.00[bcdef]	12.00[g]
15.97.8	16.67[d]	16.33[e]	26.00[cdef]	24.00[defg]
720045	17.67[d]	17.67[de]	16.00[f]	15.00[fg]
676004	16.00[d]	20.00[cde]	23.67[def]	28.67[cdefg]
720071	22.00[bcd]	27.00[bcde]	30.00[bcdef]	31.67[bcdefg]
285378.27	34.00[abc]	42.33[ab]	44.33[abcde]	44.33[abcd]
720097	16.33[d]	15.00[e]	17.00[f]	18.00[efg]
676103	18.00[d]	21.00[bcde]	18.00[f]	16.67[fg]
FS1	16.00[d]	24.50[bcde]	23.00[def]	26.67[defg]
Igorota	20.67[bcd]	24.67[bcde]	16.67[f]	15.33[gf]
Ganza	27.00[bcd]	27.67[bcde]	31.67[abcdef]	40.00[abcde]
CV (%)	32.24	35.23	35.39	35.03

*Means with the same letter are not significantly different by DMRT (P > 0.05).

Plant Height at 30 and 90 DAP

Table 5 shows the height of the plants at 30 DAP. Statistically, significant differences were observed among the genotypes. Genotype 676103 produced the tallest plants which was comparable with genotype 387039.15 while FS1 produced the shortest plants. Highly significant differences were observed among the genotypes for height at 90 DAP as indicated in Table 5. Genotype 676103 produced the tallest plants at 90 DAP. FS1 was observed to have the shortest plants. These differences could be due to genotypic characteristics as influenced by the environment in which the plants were subjected into.

Table 5. Plant height of twenty potato genotypes at 30 and 90 DAP

GENOTYPE	PLANT HEIGHT* (cm)	
	30 DAP	90 DAP
384558.10	22.93^{bcd}	32.10^{ef}
380251.17	21.28^{bcd}	65.43^{c}
IP84007.67	20.13^{cde}	51.73^{cd}
285411.22	26.00^{abc}	47.20^{d}
676070	26.25^{abc}	46.60^{d}
387443.22	21.48^{bcd}	55.20^{cd}
387039.15	28.20^{ab}	63.90^{c}
676008	24.93^{abc}	48.13^{d}
387410.7	26.63^{abc}	46.78^{d}
575003	22.73^{bcd}	42.40^{def}
15.97.8	21.18^{bcd}	45.57^{de}
720045	24.53^{abc}	42.18^{def}
676004	21.63^{bcd}	54.13^{cd}
720071	21.83^{bcd}	80.10^{b}
285378.27	20.48^{cde}	55.70^{cd}
720097	15.90^{def}	49.73^{d}
676103	30.60^{a}	107.48^{a}
FS1	12.90^{f}	30.48^{f}
Igorota	27.23^{abc}	46.80^{d}
Ganza	13.90^{ef}	44.33^{def}
CV (%)	16.80	13.95

*Means with the same letter are not significantly different by DMRT (P > 0.05).

Leaf Characters

Foliage Color

The color of the leaves of twenty potato genotypes ranged from light green to intermediate to dark green (Table 6). Ganza was observed to have light green leaves. Igorota, 285411.22, 676070, 387039.15 and 676008 have dark green leaves while the others were noted to have an intermediate green leaves.

Leaf Dissection

According to the descriptors list for potato, the leaf dissection of Ganza and genotype 575003 were noted to be scarcely dissected, genotype 285378.27 had medium dissected leaves while the remaining genotypes have a weakly dissected leaves (Table 6).

Adaxial and Abaxial Leaf Pubescence

The adaxial leaf pubescence of the potato genotypes were observed to be very sparse. The abaxial or lower surface of leaves of the genotypes, however, have trichomes.

Type of Hairs (Trichomes)

The trichomes of the leaves of all the potato genotypes are simple.

Table 6. Foliage color and leaf dissection of twenty potato genotypes

GENOTYPE	FOLIAGE COLOR	LEAF DISSECTION
384558.10	Intermediate	Weakly
380251.17	Intermediate	Weakly
IP84007.67	Intermediate	Weakly
285411.22	Dark green	Weakly
676070	Dark green	Weakly
387443.22	Intermediate	Weakly
387039.15	Dark green	Weakly
676008	Dark green	Weakly
387410.7	Intermediate	Weakly
575003	Intermediate	Scarcely
15.97.8	Intermediate	Weakly
720045	Intermediate	Weakly
676004	Intermediate	Weakly
720071	Intermediate	Weakly
285378.27	Intermediate	Medium
720097	Intermediate	Weakly
676103	Intermediate	Weakly
FS1	Intermediate	Weakly
Igorota	Dark green	Weakly
Ganza	Light green	Scarcely

Number of Leaves

Highly significant differences on the number of leaves were noted among the genotypes as shown in Table 7. Genotype 387039.15 had the most number of leaves which was also comparable with genotypes 380251.17 and 285378.27. The least number of leaves was observed in genotype 15.97.8. Genotypes such as 676070 that produced few leaves were observed to have large leaves.

Leaf Area

Significant differences were observed among the genotypes for leaf area. Genotype 285411.22 significantly had the largest leaves followed by genotype 676070.

The smallest leaves were obtained from genotypes Igorota and 676103. Differences in leaf area could be due to variability in leaf shapes and dissection as noted earlier (Table 7).

Table 7. Number of leaves and leaf area of the twenty potato genotypes

GENOTYPE	NUMBER OF LEAVES*	LEAF AREA* (cm^2)
384558.10	29^{cdefg}	56.67^{ef}
380251.17	58^{ab}	59.27^{def}
IP84007.67	52^{abc}	86.83^{bc}
285411.22	53^{abc}	134.58^{a}
676070	39^{bcdef}	95.40^{b}
387443.22	45^{bcde}	49.50^{ef}
387039.15	70^{a}	59.13^{def}
676008	47^{abcd}	52.63^{ef}
387410.7	23^{defg}	51.63^{ef}
575003	27^{defg}	52.28^{ef}
15.97.8	13^{g}	29.23^{gh}
720045	23^{defg}	30.57^{gh}
676004	20^{fg}	46.53^{f}
720071	41^{bcdef}	43.50^{fg}
285378.27	61^{ab}	48.63^{ef}
720097	34^{cdefg}	64.07^{de}
676103	21^{efg}	20.67^{h}
FS1	44^{bcde}	54.23^{ef}
Igorota	14^{g}	25.70^{h}
Ganza	26^{defg}	74.33^{cd}
CV (%)	34.10	15.64

*Means with the same letter are not significantly different by DMRT ($P > 0.05$).

Stem Characters

Stem Color

The color of the stem of the potato genotypes is shown in Table 8. It was observed that genotype 676070 has combination of cream with purple stem. Purple color was noted for genotype 285378.27. Other genotypes have green stem.

Stem Cross Section

Genotypes Igorota, 15.97.8, 720045, 676004, 720071, 720097 and 676103 are observed to have round stems while the other genotypes were noted to have angular stems (Table 8).

Stem Wing

It was observed that those genotypes with round stem have no wings. Genotypes 676070, 676008, 387410.7, 575003 and 285378.27 were noted to have a straight stem wings while the other genotypes have undulate stem wings (Table 8).

Table 8. Stem color, stem cross section and stem wing of twenty potato genotypes

GENOTYPE	STEM COLOR	STEM CROSS SECTION	STEM WING
384558.10	Green	Angular	Undulate
380251.17	Green	Angular	Undulate
IP84007.67	Green	Angular	Undulate
285411.22	Green	Angular	Undulate
676070	Cream w/ Purple	Angular	Straight
387443.22	Green	Angular	Undulate
387039.15	Green	Angular	Undulate
676008	Green	Angular	Straight
387410.7	Green	Angular	Straight
575003	Green	Angular	Straight
15.97.8	Green	Round	Absent
720045	Green	Round	Absent
676004	Green	Round	Absent
720071	Green	Round	Absent
285378.27	Purple	Angular	Straight
720097	Green	Round	Absent
676103	Green	Round	Absent
FS1	Green	Angular	Undulate
Igorota	Green	Round	Absent
Ganza	Green	Angular	Undulate

Diameter of Stem

Variability was observed among the potato genotypes for stem diameter. Genotype IP84007.67 was noted to have the widest stem which was comparable with Ganza. According to Smith (1968) as cited by Gayadon (1999), larger stems were found to have greater assimilation rate per unit plant and leads to higher yield. On the other hand, genotype 676103 was observed to have the narrowest stem (Table 9).

Table 9. Diameter of stem and length of main stem of the twenty potato genotypes

GENOTYPE	DIAMETER OF STEM* (mm)	LENGTH OF MAIN STEM* (cm)
384558.10	5.30^{bcde}	26.13^{efg}
380251.17	5.67^{abc}	52.70^{b}
IP84007.67	6.83^{a}	40.80^{bcdef}
285411.22	5.37^{bcd}	41.33^{bcdef}
676070	4.43^{cdefg}	37.47^{bcdefg}
387443.22	5.40^{bcd}	41.80^{bcdef}
387039.15	5.60^{abcd}	50.03^{b}
676008	5.37^{bcd}	33.40^{cdefg}
387410.7	3.83^{fg}	32.83^{defg}
575003	3.77^{fg}	31.30^{defg}
15.97.8	3.90^{efg}	25.30^{fg}
720045	3.67^{fg}	26.60^{efg}
676004	4.53^{cdefg}	37.00^{bcdefg}
720071	4.90^{bcdef}	78.33^{a}
285378.27	5.03^{bcdef}	47.83^{bcd}
720097	5.60^{abcd}	49.83^{bc}
676103	3.40^{g}	90.00^{a}
FS1	4.97^{bcdef}	23.70^{g}
Igorota	4.13^{defg}	38.90^{bcdefg}
Ganza	6.30^{ab}	42.37^{bcde}
CV (%)	15.30	20.43

*Means with the same letter are not significantly different at by DMRT (P > 0.05).

Length of Main Stem

Highly significant differences were noted for the length of main stem of the potato genotypes. The genotypes with the longest main stem were 676103 and 720071. On the other hand, FS1 had the shortest main stem. It was also noted that genotypes with longer main stem had longer internodes as observed in genotypes 676103 and 720071 (Table 9).

Length of Internodes

Significant differences on the length of internodes among the genotypes were observed. Genotype 676103 produced the longest internodes which was significantly different with genotype 720071. In contrast, FS1 had the shortest internodes. It was observed that genotype 676103 which had the longest internode also produced the longest main stem, while FS1 which had the shortest internodes exhibited the shortest main stem (Table 10).

Number of Nodes

Table 10 summarizes the number of nodes of the twenty potato genotypes. Statistically, highly significant differences were noted among the genotypes. Genotype 387039.15 had the most number of nodes which was significantly different with genotypes 676103 and 380251.17. On the other hand, genotypes Igorota, 384558.10 and FS1 produced the least number of nodes.

Number of Secondary Stems

Number of secondary stems were observed to be significant among the twenty genotypes of potato. Genotype 387039.15 was noted to have the most secondary stems which was comparable with genotype 380251.17. On the other hand, genotype 15.97.8 had the least secondary stems.

Table 10. Length of internodes, number of nodes and secondary stems of twenty potato genotypes

GENOTYPE	LENGTH OF INTERNODES*	NUMBER OF NODES*	NUMBER OF SECONDARY STEMS*
384558.10	5.53^{efg}	15^{d}	3^{cdefg}
380251.17	7.27^{cde}	21^{b}	5^{ab}
IP84007.67	7.73^{bcd}	20^{bc}	5^{abc}
285411.22	7.23^{cde}	19^{bcd}	5^{abcd}
676070	7.93^{bcd}	18^{bcd}	3^{bcdefg}
387443.22	6.70^{def}	18^{bcd}	5^{abcd}
387039.15	8.60^{bc}	25^{a}	6^{a}
676008	7.07^{cde}	20^{bc}	4^{abcde}
387410.7	6.40^{defg}	18^{bcd}	2^{fg}
575003	6.60^{def}	19^{bcd}	2^{efg}
15.97.8	5.53^{efg}	19^{bcd}	1^{g}
720045	5.71^{efg}	20^{bc}	2^{defg}
676004	7.20^{cde}	16^{cd}	1^{fg}
720071	9.20^{b}	20^{bc}	3^{bcdefg}
285378.27	7.67^{bcd}	20^{bc}	4^{abcdef}
720097	7.20^{cde}	15^{d}	2^{efg}
676103	11.10^{a}	21^{b}	2^{efg}
FS1	4.70^{g}	15^{d}	3^{bcdefg}
Igorota	7.17^{cde}	15^{d}	1^{g}
Ganza	5.07^{fg}	18^{bcd}	2^{fg}
CV (%)	13.02	11.77	42.95

*Means with the same letter are not significantly different by DMRT ($P > 0.05$).

<u>Presence/Absence of Flowers</u>

Among the twenty potato genotypes characterized, it was observed that only ten of the genotypes produced flowers. These are genotypes 380251.17, IP84007.67, 285411.22, 387443.22, 387039.15, 676004, 720097, 676103, Igorota and Ganza.

Table 11. Presence/absence of flowers of the twenty potato genotypes

GENOTYPE	PRESENCE/ABSENCE OF FLOWER
384558.10	Absent
380251.17	Present
IP84007.67	Present
285411.22	Present
676070	Absent
387443.22	Present
387039.15	Present
676008	Absent
387410.7	Absent
575003	Absent
15.97.8	Absent
720045	Absent
676004	Present
720071	Absent
285378.27	Absent
720097	Present
676103	Present
FS1	Absent
Igorota	Present
Ganza	Present

Root Characters

Number of Roots

The fibrous roots of the plants were counted and measured. As shown in Table 12, the differences observed in the number of roots of the potato genotypes is significant. Genotype 285411.22 produced the most number of roots which is comparable with genotype 387039.15. On the other hand, genotype 676103 produced the least number of roots.

Table 12. Root characters of twenty potato genotypes

GENOTYPE	NUMBER OF ROOTS*	LENGTH OF ROOTS* (cm)
384558.10	5^{hi}	12.67^{bcdef}
380251.17	9^{efghi}	15.33^{abcd}
IP84007.67	15^{bc}	16.33^{ab}
285411.22	21^{a}	16.00^{abc}
676070	15^{bcd}	15.30^{abcd}
387443.22	11^{cdefg}	13.00^{bcdef}
387039.15	19^{ab}	18.20^{a}
676008	7^{fghi}	11.37^{defg}
387410.7	9^{defgh}	10.27^{fg}
575003	13^{cde}	12.77^{bcdef}
15.97.8	10^{cdefgh}	8.27^{gh}
720045	11^{cdef}	12.13^{cdef}
676004	6^{ghi}	10.57^{efg}
720071	9^{efghi}	13.77^{bcdef}
285378.27	6^{ghi}	14.47^{abcde}
720097	6^{ghi}	13.70^{bcdef}
676103	4^{i}	5.93^{h}
FS1	6^{ghi}	11.17^{efg}
Igorota	5^{hi}	6.50^{h}
Ganza	7^{fghi}	13.97^{bcdef}
CV (%)	28.96	16.22

*Means with the same letter are not significantly different by DMRT (P > 0.05).

Length of Roots

Table 12 summarizes the length of roots of the twenty genotypes of potato. Statistically, significant differences were observed. Genotype 387039.15 had significantly the longest root and was comparable with genotypes IP84007.67 and 285411.22. Genotype 676103 registered the shortest roots.

Tuber Characters

Predominant Tuber Skin Color

Table 13 summarizes the predominant tuber skin color of the twenty potato genotypes. Genotypes 285411.22, 676008, 720097 and 676103 were noted to have purplish-red tuber, genotype 384558.10 had brownish tuber and genotype 676070 has pink tubers. The other genotypes were observed to have a yellow tubers while genotype 285378.27 has purple tubers.

Tuber Shape

Genotypes 384558.10 and 676070 were observed to have oblong shape while genotypes 387443.22, 720071 and 676103 were noted also to have an ovate tuber. Other genotypes were noted to have a round tubers (Table 13).

Number of Eyes/Tuber

Tubers of genotype 285411.22 significantly had the most number of eyes which is comparable with genotype 384558.10. On the other hand, Igorota tubers had the least number of eyes (Table 13).

Table 13. Predominant skin color, tuber shape and number of eyes per tuber of twenty potato genotypes

GENOTYPE	PREDOMINANT SKIN COLOR	TUBER SHAPE	NUMBER OF EYES PER TUBER*
384558.10	Brownish	Oblong	10^{ab}
380251.17	Yellow	Round	8^{bc}
IP84007.67	Yellow	Round	6^{defg}
285411.22	Purplish-red	Round	11^{a}
676070	Pink	Oblong	7^{bcde}
387443.22	Yellow	Ovate	6^{cdef}
387039.15	Yellow	Round	9^{b}
676008	Purplish-red	Round	8^{bcd}
387410.7	Yellow	Round	5^{efg}
575003	Yellow	Round	5^{fg}
15.97.8	Yellow	Round	5^{fg}
720045	Yellow	Round	5^{fg}
676004	Yellow	Round	6^{defg}
720071	Yellow	Ovate	6^{defg}
285378.27	Purple	Round	6^{defg}
720097	Purplish-red	Round	6^{defg}
676103	Purplish-red	Ovate	7^{bcde}
FS1	Yellow	Round	6^{defg}
Igorota	Yellow	Round	4^{g}
Ganza	Yellow	Round	7^{bcde}
CV (%)			17

*Means with the same letter are not significantly different by DMRT (P > 0.05).

Depth of Eyes

Tubers of genotypes 380251.17, 387443.22, 676008, 387410.7 and FS1 have protruding eyes, tubers of genotype 285378.27 had a deep eyes, tubers of genotype 676103 have medium depth of eyes while the other genotypes have shallow eyes in their tubers (Table 14). In terms of chipping, potatoes with shallow and protruding eyes lessens the trimming loss compared with those have deep and medium depth of eyes as reported.

<u>Predominant Tuber Flesh Color</u>

Genotypes 720097 and 575003 had tubers with yellow cream tuber flesh. Genotypes 387039.15, 380251.17 and 384558.10 have white tuber flesh and Igorota had yellow tuber flesh. The other genotypes have a cream tuber flesh (Table 14).

Table 14. Depth of eyes and predominant tuber flesh color of twenty potato genotypes

GENOTYPE	DEPTH OF EYES	PREDOMINANT TUBER FLESH COLOR
384558.10	Shallow	White
380251.17	Protruding	White
IP84007.67	Shallow	Cream
285411.22	Shallow	Yellow
676070	Shallow	Cream
387443.22	Protruding	Cream
387039.15	Shallow	White
676008	Protruding	Yellow
387410.7	Protruding	Cream
575003	Shallow	Yellow-cream
15.97.8	Shallow	Yellow
720045	Shallow	Cream
676004	Shallow	Cream
720071	Shallow	Cream
285378.27	Deep	Cream
720097	Shallow	Yellow-cream
676103	Medium	Cream
FS1	Protruding	Yellow
Igorota	Shallow	Yellow
Ganza	Shallow	Yellow

Haulm Weight

As shown in Table 15, genotype 380251.17 had the heaviest haulm weight of 80.32 g which was comparable with genotype 387039.15 while Igorota had the lightest haulm weight with a mean of 6.84. Highly significant differences in the haulm weight existed among the twenty potato genotypes.

Table 15. Haulm weight of twenty potato genotypes

GENOTYPE	HAULM WEIGHT* (g/plant)
384558.10	5.03[f]
380251.17	80.32[a]
IP84007.67	53.00[abc]
285411.22	51.44[abcd]
676070	21.02[bcdef]
387443.22	14.94[bcdef]
387039.15	55.07[ab]
676008	40.37[abcdef]
387410.7	12.86[f]
575003	26.06[bcdef]
15.97.8	7.07[ef]
720045	18.67[bcdef]
676004	37.54[bcdef]
720071	48.33[abcde]
285378.27	45.10[abcdef]
720097	35.28[bcdef]
676103	15.44[bcdef]
FS1	10.13[def]
Igorota	6.84[ef]
Ganza	26.29[bcdef]
CV (%)	68.01

*Means with the same letter are not significantly different by DMRT (P > 0.05).

Tuber Yield Parameters

Weight of Marketable Tubers

Genotype 387039.15 produced the heaviest marketable tubers, followed by genotype 384558.10. Genotype 676103, on the other hand, which produced the least number of marketable tubers also produced the lowest weight of marketable tubers (Table 16).

Weight of Non-marketable Tubers

Genotype IP84007.67 significantly had the highest weight of non-marketable tubers produced followed by genotype 387443.22. On the other hand, genotype 676103 which had the least number of non-marketable tubers also had the lowest weight of non-marketable tubers produced (Table 16).

Total Weight of Tubers

Significant differences in the total weight of marketable tubers were noted among the genotypes. Genotype 387039.15 produced the heaviest weight of tubers and was comparable with genotypes 384558.10, 380251.17, IP84007.67, 676070, 720045 and Ganza while genotype 676103 produced the lightest weight of tubers (Table 16).

Table 16. Weight of marketable, non-marketable and total yield of twenty potato genotypes

GENOTYPE	WEIGHT OF MARKETABLE TUBERS* (g/plant)	WEIGHT OF NON-MARKETABLE TUBERS* (g/plant)	TOTAL YIELD* (g/plant)
384558.10	89.75[b]	10.14[e]	99.89[ab]
380251.17	78.51[b]	9.81[c]	88.46[ab]
IP84007.67	79.67[b]	28.83[a]	108.5[ab]
285411.22	18.71[cd]	7.63[c]	26.34[b]
676070	2.50[cd]	3.76[c]	58.62[ab]
387443.22	29.59[cd]	13.81[b]	40.48[b]
387039.15	145.98[a]	9.65[c]	155.64[a]
676008	11.69[cd]	3.87[c]	15.56[b]
387410.7	30.49[cd]	6.04[c]	36.53[b]
575003	22.99[cd]	5.72[c]	139.52[a]
15.97.8	23.36[cd]	6.19[c]	29.55[b]
720045	53.33[bcd]	13.33[c]	66.67[ab]
676004	29.30[cd]	3.78[c]	33.07[b]
720071	10.32[cd]	4.16[c]	14.41[b]
285378.27	26.93[cd]	4.23[c]	31.16[b]
720097	29.96[cd]	3.83[c]	33.79[b]
676103	7.14[cd]	3.65[c]	10.79[b]
FS1	22.81[cd]	10.36[c]	33.16[b]
Igorota	14.20[cd]	10.13[c]	24.33[b]
Ganza	57.54[bc]	9.25[c]	66.79[ab]
CV (%)	56.98	68.64	88.86

*Means with the same letter are not significantly different by DMRT (P > 0.05).

Dry Matter Content (DMC) of Tubers

Highly significant differences were noted among the potato genotypes for DMC. Genotype 387443.22 had the highest DMC of tubers and not significantly different with genotypes 384558.10 and 380251.17 but is comparable with genotypes 676004 and FS1. Genotype 676103, on the other hand, had the lowest DMC of tubers.

Table 17. Dry matter content (DMC) of tubers and harvest index of twenty potato genotypes

GENOTYPE	DRY MATTER CONTENT OF TUBERS*	HARVEST INDEX*
384558.10	28.88[a]	0.32[abc]
380251.17	28.90[a]	0.36[a]
IP84007.67	26.53[abc]	0.27[bcdef]
285411.22	21.77[abcd]	0.26[cdef]
676070	22.17[abcd]	0.23[def]
387443.22	29.17[a]	0.27[bcdef]
387039.15	19.83[bcd]	0.24[def]
676008	22.87[abcd]	0.22[ef]
387410.7	21.20[abcd]	0.32[abc]
575003	20.53[bcd]	0.22[ef]
15.97.8	18.23[cd]	0.21[f]
720045	18.50[cd]	0.21[f]
676004	27.93[ab]	0.30[abcd]
720071	22.37[abcd]	0.29[abcde]
285378.27	23.50[abcd]	0.33[abc]
720097	16.17[d]	0.21[f]
676103	6.77[e]	0.11[g]
FS1	27.57[ab]	0.34[ab]
Igorota	22.50[abcd]	0.27[bcdef]
Ganza	23.30[abcd]	0.31[abc]
CV (%)	18.82	14.42

*Means with the same letter are not significantly different by DMRT (P > 0.05).

Harvest Index

Highly significant differences on the harvest index existed among the twenty genotypes of potato as shown in Table 17. Genotype 380251.17 had the highest harvest index and is comparable to FS1. Genotype 676103 which had the lowest DMC of tubers produced the lowest harvest index.

Correlation Between Marketable Yield
and Harvest Index to Other Characters

The correlation done between marketable yield with other characters are shown in Table 18. A strong significant positive correlation was identified between marketable yield and number of secondary stems and haulm weight. This implies that marketable yield increases as the number of secondary stems increase. According to MAF (1992) as cited by Gayadon (1999), yield of potato had been shown experimentally to be related to the number of stems per unit area planted in conventionally produced potatoes. The positive significant correlation between marketable yield and haulm weight implies that as haulm weight increases marketable yield increases. According to Aparra and Mamicpic (1980) as cited by Shagol (2001), sweetpotato vine weight, vine number, vine diameter, leaf weight and leaf area were found to be significantly and positively correlated with root yield. Significant positive correlation existed between marketable yield and canopy cover at 75 DAP, diameter of stem, as well as the length of roots. In a study conducted by Shagol (2001), characters such as canopy cover, number of leaves, stem diameter, number of nodes, as well as vine length were identified to have positive correlation with marketable yield in sweet potato varieties under conventional production. In the correlation between harvest index with other characters, only dry matter content of tubers and leaf area showed significant positive correlation with harvest index. This implies that as DMC of tubers and leaf area increases, harvest index increases. The strong positive correlation of DMC of tubers to harvest index indicates high dry matter partitioning in the tubers. In a study conducted by Gibson (2002) under conventional potato production, the DMC of tubers was found to be significantly and positively correlated with harvest index.

Table 18. Correlation between marketable yield and harvest index to other characters (r = 0.329)

CHARACTERS	MARKETABLE YIELD	HARVEST INDEX
Plant height at 30 DAP	0.115	-0.078
Plant height at 90 DAP	0.211	-0.241
Canopy cover at 30 DAP	0.005	0.107
Canopy cover at 45 DAP	0.241	-0.001
Canopy cover at 65 DAP	0.224	0.066
Canopy cover at 75 DAP	0.418*	-0.102
Number of leaves	0.249	-0.014
Leaf area	0.093	0.371*
Length of main stem	-0.165	-0.187
Diameter of stem	0.354*	0.048
Length of internodes	0.143	0.006
Number of nodes	0.187	-0.135
Number of secondary stem	0.444**	-0.198
Number of roots	0.027	0.215
Length of roots	0.328*	-0.049
Number of eyes/tuber	0.178	-0.041
DMC of tubers	-0.205	0.840**
Haulm weight	0.444**	0.069
Harvest index	-0.083	1.00
Marketable yield	1.00	

* - Significant at 5 % level of probability
** - Highly significant at 5 % level of probability

Correlation Analysis Among Leaf, Stem, Root and Tuber Characters

Plant Height

Significant positive correlation was identified between plant height at 30 DAP and length of internodes. This indicates that potato genotypes with longer internodes are tall.

Plant height at 90 days after planting was found to be significantly and positively correlated with canopy cover at 45 DAP, number of leaves and secondary stems. This indicate that tall plants may have more leaves and secondary stems (Table 19).

Number of Leaves

Number of leaves showed highly significant and positive correlation with number of nodes and secondary stems (Table 19). This indicates that those genotypes with the most leaves have more secondary stems and nodes.

Leaf Area

High positive correlation was identified between leaf area and number of leaves. On the other hand, leaf area was negatively correlated with the length of internodes and number of eyes per tuber (Table 19).

Haulm Weight

High positive correlation was noted between haulm weight and canopy cover at 75 DAP and number of roots. This indicates that those genotypes with the highest canopy cover at 75 and more roots have heaviest haulm weight. While high negative correlation was found between haulm weight and length of roots (Table 19).

Length of Main Stem

Results showed that length of main stem was significantly and positively correlated with the length of internodes. This indicates that those genotypes with longer internodes also produced longer main stem as exhibited by genotypes 676103, 720071 and 387039.15. On the other hand, number and length of roots as well as dry matter content of tubers were found to be negatively correlated with the length of main stem (Table 19).

Diameter of Stem

Significant positive correlation was identified between diameter of stem and canopy cover at 30, 45 and 75 DAP (Table 19). This implies that potato genotypes with highest canopy cover had wider stem diameter.

Length of Internode

Significant and positive correlation was noted between length of internode and number of roots. This indicates that potato genotypes with more leaves may have longer internodes. On the other hand, negative correlation was noted between length of internodes and length of roots and dry matter content of tubers (Table 19).

Number of Nodes

Significant positive correlation was found between number of nodes and number of secondary stems. This indicates that genotypes with more secondary stem may have more nodes. Negative correlation, on the other hand was noted between number of nodes and number of roots and dry matter content of roots (Table 19).

Number of Secondary Stems

Significant positive correlation was found between number of secondary stems and length of roots as well as the marketable yield. On the other hand, number of secondary stems was negatively correlated with dry matter content of tubers (Table 19).

Number of Roots

Significant and positive correlation was noted between number of roots and length of internodes. On the other hand, high negative correlation was found between number of roots and plant height at 90 DAP (Table 19).

Length of Roots

No significant correlation was noted between length of roots and the other characters measured (Table 19.)

Number of Eyes Per Tuber

High positive correlation was found between the number of eyes per tuber and number of nodes. On the other hand, it was revealed that number of eyes per tuber has high negative correlation with length of main stem and canopy cover at 45 DAP (Table 19).

Dry Matter Content of Tubers

Results of correlation coefficient analysis between dry matter content of tubers and canopy cover at 90 DAP revealed high positive correlation. On the other hand, high negative correlation was found between dry matter content of tubers and number of secondary stem (Table 19).

Table 19. Correlation analysis among leaf, stem, root and tuber characters

	PH30	PH90	CC30	CC45	CC65	CC75	NL	LA	HW	LMS	DS	LI	NN	NSS	NR	LR	NE/T	DMCT
PH30	1.00																	
PH90	0.257	1.00																
CC30	0.194	0.014	1.00															
CC45	0.287	0.328*	0.574**	1.00														
CC65	0.214	0.055	0.584**	0.794**	1.00													
CC75	0.200	0.257	0.406*	0.808**	0.796**	1.00												
NL	0.243	0.325*	-0.012	0.367*	0.310	0.384	1.00											
LA	-0.138	0.129	-0.092	0.112	-0.009	0.110	0.259	1.00										
HW	0.162	0.034	0.089	0.216	0.169	0.299	0.161	0.194	1.00									
LMS	0.136	0.230	0.220	0.456**	0.459**	0.375*	0.136	-0.075	0.244	1.00								
DS	0.283	0.129	0.344*	0.387*	0.244	0.442**	0.195	0.158	0.126	0.139	1.00							
LI	0.418*	0.249	0.251	0.295	0.416*	0.205	0.284	-0.120	0.221	0.261	0.045	1.00						
NN	0.102	0.237	-0.099	0.129	0.045	0.142	0.478**	0.185	0.146	0.130	0.059	0.022	1.00					
NSS	0.290	0.350*	-0.047	0.320	0.324*	0.420*	0.746**	0.110	0.090	0.137	0.277	0.262	0.352*	1.00				
NR	0.190	-0250	0.086	-0.099	0.214	-0.043	0.113	0.131	0.270	-0.003	0.036	0.509**	-0.062	0.140	1.00			
LR	-0.142	0.068	-0.145	-0.133	-0.087	-0.037	-0.089	0.139	-0.269	-0.085	0.159	-0.088	0.147	0.293	-0.096	1.00		
NE/T	-0.115	0.026	-0.098	-0.244	-0.238	-0.062	-0.094	-0.128	-0.138	-0.249	-0.063	-0.139	0.284	0.020	0.056	0.041	1.00	
DMCT	-0.010	0.217	0.319	0.126	0.186	-0.029	-0.142	0.124	-0.027	0.055	0.111	-0.015	-0.221	-0.230	0.043	-0.195	-0.121	1.00

* - Significant

** - Highly significant

Legend:

PH30	Plant height at 30 DAP	LMS	Length of main stem	HW	Haulm weight
PH90	Plant height at 90 DAP	DS	Diameter of stem	NE/T	Number of eyes per tuber
CC30	Canopy cover at 30 DAP	LI	Length of internodes		
CC45	Canopy cover at 45 DAP	NN	Number of nodes		
CC65	Canopy cover at 65 DAP	NSS	Number of secondary stems		
CC75	Canopy cover at 75 DAP	NR	Number of roots		
NL	Number of leaves	LR	Length of roots		
LA	Leaf area	DMCT	Dry matter content of tubers		

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

This study was conducted to characterize twenty potato genotypes for their morphological characters and to correlate morphological and marketable yield in potato genotypes grown organically at Benguet State University Experimental Station, Balili La Trinidad Benguet from May to August 2005.

The twenty potato genotypes showed variability for leaf, stems, roots and tuber characters. Significant differences of all characters measured were observed among the genotypes. Correlation analysis was done to determine the relationship among the different characters and to identify those characters associated with yield grown organically.

In correlation between marketable yield with other characters, number of secondary stems, haulm weight, canopy cover at 75 DAP, diameter of stem and length of roots showed significant positive correlation with marketable yield. Other characters with high positive correlation with marketable yield are plant height at 90 DAP and canopy cover 45 and 65 DAP as well as number of leaves. In the correlation done between harvest index and other characters, only the dry matter content of tubers and leaf area showed significant positive correlation.

Among the leaf, stem, root and tuber characters correlated, significant positive correlation were observed between plant height at 30 DAP and length of internodes; plant height at 90 DAP and canopy cover at 45 DAP, number of leaves as well as number of secondary stems; length of internodes and number of roots and between number of nodes and number of secondary stems.

Conclusion

Variability existed among the different genotypes in the morphological characters measured.

Correlation analysis revealed that marketable yield was significantly correlated with number of secondary stems, haulm weight, canopy cover at 75 DAP, diameter of stem and length of roots. Significant positive correlation exists between harvest index and dry matter content of tubers and leaf area.

As for the leaf, stem, root and tuber characters, significant positive correlation were identified between plant height at 30 DAP and length of internodes; plant height at 90 DAP and canopy cover at 45 DAP, number of leaves and secondary stems; number of leaves and number of nodes as well as secondary stems; length of internodes and number of roots and between number of nodes and secondary stems.

Recommendation

Canopy cover at 75 DAP, number of secondary stems and haulm weight could be used as indices for selection of varieties or genotypes for organic production of potato. Since morphological characters are difficult to assess and sometimes not reliable, a more precise way to characterize is the use of DNA markers. Research towards DNA profiling could be done for the best potato genotypes for organic production.

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APPENDICES

APPENDIX TABLE 1. Canopy cover at 30 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	29	39	61	129	29.00
380251.17	22	33	32	87	29.00
IP84007.67	15	23	28	66	22.00
285411.22	17	24	31	72	24.00
676070	19	31	28	78	26.00
387443.22	10	38	26	74	24.67
387039.15	31	25	50	106	35.33
676008	14	19	24	57	19.00
387410.7	16	22	18	56	18.67
575003	20	18	19	57	19.00
15.97.8	13	22	15	50	16.67
720045	20	22	11	53	17.67
676004	14	20	14	48	16.00
720071	33	13	20	66	22.00
285378.27	40	28	34	102	34.00
720097	15	18	16	49	16.33
676103	17	25	12	54	18.00
FS1	26	12	10	48	16.00
Igorota	24	18	20	62	20.67
Ganza	20	30	31	81	27.00
TOTAL	415.00	480.00	500.00	1,395.00	465.00
MEAN	20.75	24.00	25.00	69.75	23.25

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	228.409	114.205			
Treatment	19	3,002.888	158.047	2.78**	1.85	2.40
Error	38	1,936.258	56.949			
TOTAL	59	5,167.554				

** – Highly significant

Coefficient of Variation = 32.24 %
Standard Error = 7.55

APPENDIX TABLE 2. Canopy cover at 45 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	57	30	81	168	56.00
380251.17	36	48	67	151	50.33
IP84007.67	18	25	39	82	27.33
285411.22	40	44	24	108	36.00
676070	24	53	39	116	38.67
387443.22	26	61	38	125	41.67
387039.15	37	40	44	121	40.33
676008	21	25	38	84	28.00
387410.7	23	34	24	81	27.00
575003	23	16	16	55	18.33
15.97.8	17	21	11	49	16.33
720045	21	22	10	53	17.67
676004	18	20	22	60	20.00
720071	25	16	40	81	27.00
285378.27	40	39	48	127	42.33
720097	10	19	16	45	15.00
676103	20	28	15	63	21.00
FS1	17	22	35	74	24.50
Igorota	25	18	31	74	24.67
Ganza	26	33	24	83	27.67
TOTAL	524.00	614.00	662.00	1,800.00	599.60
MEAN	26.20	30.70	33.10	90.00	29.98

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	348.904	174.452			
Treatment	19	7,481.615	393.753	3.53**	1.85	2.40
Error	38	3,792.762	111.552			
TOTAL	59	11,622.982				

** – Highly significant

Coefficient of Variation = 35.23 %
Standard Error = 10.56

APPENDIX TABLE 3. Canopy cover at 65 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	45	31	77	153	51.00
380251.17	38	48	80	166	55.33
IP84007.67	44	52	51	147	49.00
285411.22	50	60	21	131	43.67
676070	27	61	46	134	44.67
387443.22	29	60	49	138	46.00
387039.15	41	49	74	164	54.67
676008	25	35	56	116	38.67
387410.7	27	28	5	60	20.00
575003	22	32	27	81	27.00
15.97.8	23	29	26	78	26.00
720045	21	22	5	48	16.00
676004	29	20	22	71	23.67
720071	26	25	40	90	30.00
285378.27	40	45	48	133	44.33
720097	10	22	19	51	17.00
676103	17	21	16	54	18.00
FS1	17	26	26	69	23.00
Igorota	20	13	17	50	16.67
Ganza	29	38	28	95	31.67
TOTAL	579.00	717.00	733.00	2,029.00	676.00
MEAN	28.95	35.85	36.65	101.45	33.80

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	437.026	281.513			
Treatment	19	10,212.887	537.520	3.73**	1.85	2.40
Error	38	4,896.641	144.019			
TOTAL	59	15,546.554				

** – Highly significant

Coefficient of Variation = 35.39 %
Standard Error = 12.00

APPENDIX TABLE 4. Canopy cover at 75 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	45	31	77	153	51.00
380251.17	46	48	80	174	58.00
IP84007.67	50	52	50	152	50.67
285411.22	60	54	42	156	52.00
676070	30	54	17	101	33.67
387443.22	25	53	29	107	35.67
387039.15	62	53	39	154	51.33
676008	30	36	36	102	34.00
387410.7	23	18	4	45	15.00
575003	10	22	4	36	12.00
15.97.8	18	30	24	72	24.00
720045	20	20	5	45	15.00
676004	36	25	25	86	28.67
720071	30	25	40	95	31.67
285378.27	40	45	48	133	44.33
720097	13	22	19	54	18.00
676103	20	19	11	50	16.67
FS1	22	31	27	80	26.67
Igorota	23	13	10	46	15.33
Ganza	38	48	34	120	40.00
TOTAL	641.00	699.00	621.00	1,961.00	653.40
MEAN	32.05	34.95	31.05	98.05	32.67

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	88.352	44.176			
Treatment	19	12,148.276	639.383	4.49**	1.85	2.40
Error	38	4,616.148	18.226			
TOTAL	59	16,852.776				

** – Highly significant

Coefficient of Variation = 35.39 %
Standard Error = 11.32

APPENDIX TABLE 5. Plant height at 30 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	17.0	20.9	30.9	68.8	22.93
380251.17	20.5	19.4	23.9	63.8	21.27
IP84007.67	22.0	17.0	21.4	60.4	20.13
285411.22	28.1	26.0	23.9	78.0	26.00
676070	26.3	24.5	28.0	78.8	26.25
387443.22	19.7	23.0	21.7	64.4	21.47
387039.15	28.0	26.7	29.9	84.6	28.20
676008	17.5	25.7	31.6	74.8	24.93
387410.7	21.2	33.7	25.0	79.9	26.63
575003	23.3	22.4	22.5	68.2	22.73
15.97.8	19.8	20.4	23.3	63.5	21.17
720045	25.6	27.9	20.1	73.6	24.53
676004	12.8	26.2	25.9	64.9	21.63
720071	13.7	23.1	28.7	65.5	21.83
285378.27	18.7	20.2	22.5	61.4	20.47
720097	13.7	14.7	19.3	47.7	15.90
676103	23.7	34.2	33.9	91.8	30.60
FS1	13.4	10.6	14.7	38.7	12.90
Igorota	23.9	28.9	28.9	81.7	27.23
Ganza	13.6	12.2	15.9	41.7	13.90
TOTAL	402.50	457.70	492.00	1,352.20	450.40
MEAN	20.13	22.89	24.60	67.61	22.52

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	227.190	113.595			
Treatment	19	1,170.770	61.619	4.35**	1.85	2.40
Error	38	510.262	14.174			
TOTAL	59	1,908.22				

** – Highly significant

Coefficient of Variation = 16.80 %
Standard Error = 3.76

APPENDIX TABLE 6. Plant height at 90 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	35.8	28.0	32.5	96.3	32.10
380251.17	70.8	58.8	66.7	196.3	65.43
IP84007.67	43.9	50.6	60.7	155.2	51.73
285411.22	49.0	47.2	45.5	141.6	47.20
676070	41.8	51.6	46.4	139.8	46.60
387443.22	58.0	55.6	52.0	165.6	55.20
387039.15	72.2	64.3	55.2	191.7	63.90
676008	46.2	47.1	51.1	144.4	48.13
387410.7	37.9	55.6	46.8	140.3	46.77
575003	54.3	48.9	24.0	127.2	42.40
15.97.8	46.7	44.4	45.6	136.7	45.57
720045	34.8	46.7	45.0	126.5	42.17
676004	52.3	49.8	60.3	162.4	54.13
720071	81.1	75.0	54.2	240.3	80.10
285378.27	57.1	49.9	60.1	167.1	55.70
720097	33.5	60.0	55.7	149.2	49.73
676103	102.9	115.0	103.7	321.6	107.20
FS1	29.9	28.0	33.5	91.4	30.47
Igorota	48.8	44.8	46.8	140.4	46.80
Ganza	49.2	39.7	44.1	133.0	44.33
TOTAL	1,046.20	1,061.00	1,059.80	3,167.00	1,055.60
MEAN	52.31	53.05	52.99	158.35	52.78

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	4.028	2.014			
Treatment	19	16,279.482	586.815	15.69**	1.85	2.40
Error	38	1,965.578	54.599			
TOTAL	59					

** – Highly significant

Coefficient of Variation = 13.95 %
Standard Error = 7.39

APPENDIX TABLE 7. Number of leaves at 60 DAP

TREATMENT	BLOCK I	BLOCK II	BLOCK III	TOTAL	MEAN
384558.10	30.9	19.3	36.5	86.7	28.90
380251.17	43.1	49.2	82.8	175.1	58.37
IP84007.67	42.0	47.8	66.5	156.3	52.10
285411.22	43.9	69.9	45.4	159.2	53.07
676070	35.4	40.9	41.3	117.6	39.03
387443.22	48.2	47.6	40.2	136.0	45.33
387039.15	67.6	58.9	82.5	209.0	69.67
676008	12.5	63.6	65.0	141.1	47.03
387410.7	19.5	16.7	32.0	68.2	22.73
575003	23.5	39.3	19.0	81.8	27.27
15.97.8	12.7	13.2	12.9	38.8	12.93
720045	19.0	30.2	20.0	69.2	23.07
676004	19.2	17.0	23.8	60.0	20.00
720071	19.8	39.4	65.1	124.3	41.43
285378.27	48.0	59.6	76.5	184.0	61.33
720097	22.0	24.8	53.9	100.7	33.57
676103	18.8	25.4	20.0	64.2	21.40
FS1	23.8	25.9	82.3	132.0	44.00
Igorota	14.9	12.4	15.5	42.8	14.27
Ganza	16.2	25.2	35.4	76.8	25.60
TOTAL	581.00	726.30	916.50	2,223.80	741.00
MEAN	29.05	36.32	45.83	111.19	37.05

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F 0.05	TABULATED F 0.01
Block	2	2,831.563	1,415.782			
Treatment	19	15,518.655	816.771	5.12**	1.85	2.40
Error	38	6,067.510	159.671			
TOTAL	59	24,417.729				

** – Highly significant

Coefficient of Variation = 34.10 %
Standard Error = 12.64

APPENDIX TABLE 8. Leaf area (cm^2) at 60 DAP

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
384558.10	66.8	47.0	56.2	170.0	56.67
380251.17	57.3	54.2	66.3	177.8	59.27
IP84007.67	85.6	95.2	79.7	260.5	86.83
285411.22	142.7	125.7	135.3	403.7	134.57
676070	93.7	97.0	95.5	286.2	95.40
387443.22	51.2	48.3	49.0	148.5	49.50
387039.15	57.4	58.3	61.7	177.4	59.13
676008	52.5	52.8	52.6	157.9	52.63
387410.7	50.7	53.8	50.4	154.9	51.63
575003	54.3	58.9	43.6	156.8	52.27
15.97.8	29.6	30.2	27.9	87.7	29.23
720045	28.6	30.6	32.5	91.7	30.57
676004	38.3	41.6	59.7	139.6	46.53
720071	52.2	35.0	43.3	130.5	43.50
285378.27	34.9	68.0	43.0	145.9	48.63
720097	63.6	61.1	67.5	192.2	64.07
676103	18.4	17.8	25.8	62.0	20.67
FS1	55.6	30.9	76.2	162.7	54.23
Igorota	27.3	23.5	26.3	77.1	25.70
Ganza	60.7	83.0	79.3	223.0	74.33
TOTAL	1,121.40	1,112.90	1,171.80	3,406.10	1,135.60
MEAN	56.07	55.65	58.59	170.31	56.78

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	101.360	50.680			
Treatment	19	39,017.323	2,053.543	26.06**	1.85	2.40
Error	38	2,994.506	78.803			
TOTAL	59	42,113.190				

** – Highly significant

Coefficient of Variation = 15.64 %
Standard Error = 8.80

APPENDIX TABLE 9. Length of main stem (cm) at 65 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	22.3	26.4	29.7	78.4	26.13
380251.17	34.3	53.4	70.4	158.1	52.70
IP84007.67	34.6	44.8	43.0	122.4	40.80
285411.22	33.1	48.9	42.0	124.0	41.33
676070	24.7	45.0	37.7	112.4	37.47
387443.22	26.5	50.5	48.4	125.4	41.80
387039.15	41.1	57.0	52.0	150.1	50.03
676008	24.7	26.9	48.6	100.2	33.40
387410.7	33.2	29.0	36.3	98.5	32.83
575003	32.5	31.4	30.0	93.9	31.30
15.97.8	25.8	25.1	25.0	75.9	25.30
720045	27.1	26.9	25.8	79.8	26.60
676004	26.5	25.2	59.3	111.0	37.00
720071	67.7	68.7	98.6	235.0	78.33
285378.27	58.8	45.3	42.4	143.5	47.83
720097	43.0	58.1	48.4	149.5	49.83
676103	89.0	98.1	82.9	270.0	90.00
FS1	21.3	27.3	22.5	71.1	23.70
Igorota	41.2	35.0	40.5	116.2	38.90
Ganza	44.3	42.6	40.2	127.1	42.37
TOTAL	753.70	865.50	923.70	2,542.90	847.60
MEAN	37.69	43.28	46.19	127.15	42.38

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	746.620	373.310			
Treatment	19	15,983.923	841.259	11.22**	1.85	2.40
Error	38	2,849.580	74.989			
TOTAL	59	19,580.123				

** – Highly significant

Coefficient of Variation = 20.43 %
Standard Error = 8.66

APPENDIX TABLE 10. Diameter of stem (mm) at 65 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	4.1	4.8	7.0	15.9	5.30
380251.17	5.8	5.7	5.5	17.0	5.67
IP84007.67	7.7	6.6	6.2	20.5	6.83
285411.22	7.0	4.9	4.2	16.1	5.37
676070	4.3	4.6	4.4	13.3	4.43
387443.22	4.9	6.3	5.0	16.2	5.40
387039.15	5.8	5.9	5.1	16.8	5.60
676008	4.5	5.6	6.0	16.1	5.37
387410.7	3.6	3.8	4.1	11.5	3.83
575003	3.5	3.9	3.9	11.3	3.77
15.97.8	3.6	3.8	4.3	11.7	3.90
720045	3.6	4.0	3.4	11.0	3.6
676004	4.2	4.3	5.1	13.6	4.53
720071	5.6	3.7	5.4	14.7	4.90
285378.27	5.1	4.8	5.2	15.1	5.03
720097	5.0	5.2	6.6	16.8	5.60
676103	3.3	3.8	3.1	10.2	3.40
FS1	4.3	4.7	5.9	19.4	4.97
Igorota	3.7	3.6	5.1	12.4	4.13
Ganza	5.4	7.2	6.3	18.9	6.30
TOTAL	95.00	97.20	101.80	294.00	98.00
MEAN	4.75	4.86	5.09	14.70	4.90

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	1.204	0.602			
Treatment	19	48.800	2.568	4.57**	1.85	2.40
Error	38	21.356	0.562			
TOTAL	59	71.360				

** – Highly significant

Coefficient of Variation = 15.30 %
Standard Error = 0.75

APPENDIX TABLE 11. Length of internodes (cm) at 65 DAP

TREATMENT	BLOCK I	BLOCK II	BLOCK III	TOTAL	MEAN
384558.10	5.0	5.1	6.5	16.6	5.53
380251.17	6.4	7.1	8.3	21.8	7.27
IP84007.67	7.3	7.5	8.4	23.2	7.73
285411.22	7.8	6.7	7.2	21.7	7.23
676070	9.5	6.5	7.8	23.8	7.93
387443.22	6.6	6.7	6.8	20.1	6.70
387039.15	7.4	7.9	10.5	25.8	8.60
676008	6.6	6.6	8.0	21.0	7.07
387410.7	5.9	7.3	6.0	19.0	6.40
575003	5.1	8.2	6.5	19.8	6.60
15.97.8	5.8	5.8	5.0	16.6	5.53
720045	6.2	6.1	5.0	17.3	5.77
676004	6.5	7.1	8.0	21.6	7.20
720071	8.0	9.1	10.5	27.6	9.20
285378.27	7.4	6.8	8.8	23.5	7.67
720097	5.5	7.6	8.5	21.6	7.20
676103	9.5	12.0	11.8	33.3	11.10
FS1	4.8	4.5	4.8	14.1	4.70
Igorota	7.5	6.4	7.6	21.5	7.17
Ganza	5.2	5.3	4.7	15.2	5.07
TOTAL	134.00	140.30	150.70	425.00	141.60
MEAN	6.70	7.02	7.54	21.25	7.08

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F 0.05	TABULATED F 0.01
Block	2	7.112	3.556			
Treatment	19	124.870	6.572	7.73**	1.85	2.40
Error	38	32.321	0.851			
TOTAL	59	164.303				

** – Highly significant

Coefficient of Variation = 13.02 %
Standard Error = 0.92

APPENDIX TABLE 12. Number of nodes at 65 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	16.7	16.6	11.9	45.2	15.07
380251.17	19.8	21.3	21.5	62.6	20.87
IP84007.67	20.0	20.0	21.2	61.2	20.40
285411.22	19.2	18.4	19.5	57.1	19.03
676070	18.8	19.5	16.3	54.6	18.20
387443.22	19.2	18.4	19.5	57.1	19.03
387039.15	26.0	24.6	24.8	75.4	25.13
676008	16.8	22.0	21.5	60.3	20.10
387410.7	21.0	17.0	16.3	54.3	18.10
575003	21.4	18.3	17.5	57.5	19.07
15.97.8	17.4	21.1	19.0	57.5	19.17
720045	18.6	20.3	21.3	60.2	20.07
676004	15.0	16.0	18.0	49.0	16.33
720071	17.0	20.0	23.5	60.5	20.17
285378.27	18.5	19.3	21.5	59.3	19.77
720097	13.2	14.2	18.6	46.00	15.33
676103	22.3	18.5	22.6	43.4	21.13
FS1	16.4	13.0	16.5	45.4	15.30
Igorota	16.3	12.9	16.8	46.0	15.33
Ganza	16.5	16.7	20.1	53.3	17.77
TOTAL	369.90	370.90	562.70	1,303.50	374.20
MEAN	18.50	18.55	28.14	65.18	18.71

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	4.357	2.179			
Treatment	19	353.034	18.581	3.83**	1.85	2.40
Error	38	184.343	4.851			
TOTAL	59	541.734				

** – Highly significant

Coefficient of Variation = 11.77 %
Standard Error = 2.20

APPENDIX TABLE 13. Number of secondary stems at 65 DAP

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	1.9	2.0	4.0	7.9	2.63
380251.17	3.5	4.4	7.5	15.4	5.13
IP84007.67	5.1	5.2	4.4	14.7	4.90
285411.22	4.8	5.3	3.7	13.8	4.60
676070	2.6	4.6	2.4	9.6	3.20
387443.22	6.3	3.9	3.4	13.6	4.53
387039.15	6.4	5.5	6.5	18.4	6.13
676008	1.6	4.7	6.5	12.8	4.27
387410.7	1.8	1.4	1.8	5.0	1.67
575003	2.2	2.3	1.0	5.5	1.83
15.97.8	1.0	1.0	1.0	3.0	1.00
720045	1.5	3.0	2.0	6.5	2.17
676004	1.0	1.0	2.4	4.4	1.47
720071	1.4	3.5	3.4	8.3	2.77
285378.27	3.2	1.9	6.4	11.5	3.83
720097	1.0	1.3	3.3	5.6	1.87
676103	1.4	2.4	1.8	5.6	1.87
FS1	1.0	1.3	5.9	8.2	2.73
Igorota	1.0	1.3	1.0	3.3	1.10
Ganza	1.7	1.8	1.4	4.9	1.63
TOTAL	50.40	51.30	69.80	177.50	59.40
MEAN	2.52	2.87	3.49	8.88	2.97

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	10.014	5.007			
Treatment	19	131.093	6.900	4.25**	1.85	2.40
Error	38	61.686	1.623			
TOTAL	59	202.793				

** – Highly significant

Coefficient of Variation = 42.95 %
Standard Error = 1.27

APPENDIX TABLE 14. Number of roots at harvest

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	5.4	5.1	5.3	15.8	5.27
380251.17	8.3	7.3	11.1	26.7	8.90
IP84007.67	19.0	15.7	10.2	44.9	14.97
285411.22	16.5	25.0	20.8	62.3	20.77
676070	17.2	11.7	14.5	43.4	14.47
387443.22	13.0	10.2	10.0	33.2	11.07
387039.15	15.3	16.1	25.8	57.2	19.07
676008	8.3	7.8	5.7	21.8	7.27
387410.7	10.3	8.5	9.4	28.2	9.40
575003	10.0	15.2	12.6	37.8	12.60
15.97.8	10.1	9.5	9.8	29.4	9.80
720045	13.2	16.1	4.5	33.8	11.27
676004	5.0	5.0	8.4	18.4	6.13
720071	7.8	11.0	7.6	26.4	8.80
285378.27	5.0	6.3	5.7	17.0	5.67
720097	4.3	5.0	7.8	17.1	5.70
676103	2.8	4.7	3.3	10.8	3.60
FS1	7.3	6.0	4.6	17.9	5.97
Igorota	5.3	3.5	5.5	14.3	4.77
Ganza	6.2	7.0	6.7	19.9	6.63
TOTAL	190.30	196.70	189.30	576.30	192.20
MEAN	9.52	9.84	9.47	28.82	9.61

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	1.612	0.806			
Treatment	19	1,290.662	67.930	8.78**	1.85	2.40
Error	38	293.975	7.736			
TOTAL	59	1,586.249				

** – Highly significant

Coefficient of Variation = 28.96 %
Standard Error = 2.78

APPENDIX TABLE 15. Length of roots (cm) at harvest

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	10.6	14.7	12.7	38.0	12.67
380251.17	16.6	13.8	15.6	46.0	15.33
IP84007.67	14.8	20.7	13.5	49.0	16.33
285411.22	17.0	15.0	16.0	48.0	16.00
676070	15.0	15.6	15.3	45.9	15.30
387443.22	16.8	14.7	7.5	39.0	13.00
387039.15	16.4	20.5	17.7	54.6	18.20
676008	8.6	11.2	14.3	34.1	11.37
387410.7	10.1	10.4	10.3	30.8	10.27
575003	11.4	14.1	12.8	38.3	12.77
15.97.8	7.6	8.9	8.3	24.8	8.27
720045	11.2	10.2	15.0	36.4	12.13
676004	10.0	11.1	10.6	31.7	10.57
720071	16.4	12.9	12.0	41.3	13.77
285378.27	12.4	15.7	15.3	43.4	14.47
720097	13.8	13.6	13.7	41.1	13.70
676103	5.8	7.0	5.0	17.8	5.93
FS1	9.7	11.3	12.5	33.5	11.17
Igorota	6.7	6.5	6.3	19.5	6.50
Ganza	16.0	12.7	13.2	41.9	13.97
TOTAL	246.90	260.60	247.60	755.10	251.80
MEAN	12.35	13.03	12.38	37.76	12.59

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	5.953	2.977			
Treatment	19	580.603	30.558	7.33^{**}	1.85	2.40
Error	38	158.420	4.169			
TOTAL	59	744.977				

** – Highly significant

Coefficient of Variation = 16.22 %
Standard Error = 2.04

APPENDIX TABLE 16. Number of eyes per tuber

TREATMENT	BLOCK			TOTAL	MEAN
	I	II	III		
384558.10	8.6	9.5	8.6	26.7	8.90
380251.17	7.7	8.1	9.1	24.9	8.30
IP84007.67	5.6	5.8	6.7	18.1	6.23
285411.22	13.5	8.1	10.1	31.7	10.57
676070	6.4	6.6	9.0	22.0	7.33
387443.22	6.7	7.5	4.7	18.9	6.30
387039.15	10.4	7.2	8.1	25.7	8.57
676008	6.7	8.7	7.6	23.0	7.67
387410.7	5.5	4.8	5.5	15.8	5.27
575003	4.0	5.2	4.6	13.8	4.60
15.97.8	4.3	4.8	4.5	13.6	4.53
720045	4.6	5.1	4.9	14.6	4.87
676004	6.0	5.1	6.1	17.2	5.73
720071	5.5	7.2	4.3	17.0	5.67
285378.27	6.4	6.1	5.6	18.1	6.03
720097	5.7	6.3	6.2	18.2	6.07
676103	7.2	6.1	8.0	21.3	7.10
FS1	6.0	7.0	6.2	19.2	6.40
Igorota	3.3	3.9	5.0	12.2	4.07
Ganza	6.3	6.6	8.4	21.3	7.10
TOTAL	130.40	129.70	133.20	393.30	131.20
MEAN	6.52	6.49	6.66	19.67	6.56

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	0.343	0.172			
Treatment	19	156.202	8.221	6.83**	1.85	2.40
Error	38	45.764	1.204			
TOTAL	59	202.309				

** – Highly significant

Coefficient of Variation = 16.74 %
Standard Error = 1.09

APPENDIX TABLE 17. Haulm Weight (g/plant)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
384558.10	10.53	0.36	4.2	15.09	5.03
380251.17	56.52	52.08	132.35	240.95	80.32
IP84007.67	65.00	13.00	81.00	159.00	53.00
285411.22	81.82	15.29	57.22	154.32	51.44
676070	13.00	28.57	21.50	63.07	21.02
387443.22	21.25	18.57	5.00	44.82	14.94
387039.15	45.45	57.27	62.50	165.22	55.07
676008	80.00	31.11	10.00	121.11	40.37
387410.7	3.57	25.00	10.00	38.57	12.86
575003	13.33	41.11	23.75	78.19	26.06
15.97.8	10.00	6.67	4.55	21.22	7.07
720045	10.00	16.00	30.00	56.00	18.67
676004	11.11	33.33	68.18	112.62	37.54
720071	29.41	45.00	70.59	145.00	48.33
285378.27	35.29	60.00	40.00	135.29	45.10
720097	23.33	36.36	46.15	105.84	35.58
676103	3.81	12.50	30.00	46.31	15.44
FS1	11.11	5.00	14.29	30.40	10.13
Igorota	1.18	16.00	3.33	20.51	6.84
Ganza	12.00	46.88	20.00	78.88	26.29
TOTAL	537.71	560.10	734.61	1,832.42	624.40
MEAN	26.89	28.01	36.73	91.62	31.22

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	1,147.173	573.586			
Treatment	19	23,529.456	1,307.192	2.90**	1.85	2.40
Error	38	15,775.086	450.717			
TOTAL	59	40,451.715				

** – Highly significant

Coefficient of Variation = 68.01 %
Standard Error = 21.23

APPENDIX TABLE 18. Weight of marketable tubers (g/plant)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
384558.10	78.95	64.29	126.00	269.24	89.75
380251.17	56.52	50.00	129.41	235.93	78.64
IP84007.67	65.00	51.00	123.00	239.00	79.67
285411.22	18.18	18.24	19.72	56.14	18.71
676070	73.50	59.52	10.00	143.02	47.67
387443.22	20.83	55.00	4.17	80.00	26.67
387039.15	205.00	120.45	112.50	437.95	145.98
676008	17.00	15.56	2.50	35.06	11.69
387410.7	14.29	51.67	25.50	91.46	30.49
575003	18.00	28.89	22.08	68.97	22.99
15.97.8	12.50	46.67	10.91	70.08	23.36
720045	44.00	70.00	46.00	160.00	53.33
676004	16.67	16.67	54.55	87.89	29.30
720071	7.06	19.00	4.91	30.97	10.32
285378.27	24.12	34.00	22.67	80.79	26.43
720097	16.67	20.91	52.31	89.89	29.96
676103	1.42	6.67	13.33	21.42	7.14
FS1	20.56	15.00	32.86	68.42	22.81
Igorota	20.59	12.00	10.00	42.59	14.20
Ganza	46.00	60.63	66.00	172.63	57.54
TOTAL	776.86	816.17	888.42	2,481.45	827.15
MEAN	38.84	40.81	44.42	124.07	41.36

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	595.099	297.540			
Treatment	19	68,204.195	3,589.694	6.67**	1.85	2.40
Error	38	19,386.916	538.525			
TOTAL	59	88m186.210				

** – Highly significant

Coefficient of Variation = 56.48 %
Standard Error = 23.21

APPENDIX TABLE 19. Weight of non-marketable tubers (g/plant)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
384558.10	4.21	8.21	18.00	30.42	10.14
380251.17	6.52	2.92	20.00	29.44	9.81
IP84007.67	21.00	10.50	55.00	86.50	28.83
285411.22	10.45	4.12	8.33	22.90	7.63
676070	4.50	4.29	2.50	11.29	3.76
387443.22	25.00	6.43	10.00	41.43	13.81
387039.15	7.27	3.18	18.50	28.95	9.65
676008	4.00	6.11	1.50	11.61	3.87
387410.7	4.29	8.33	5.50	18.12	6.04
575003	4.67	10.00	2.50	17.17	5.72
15.97.8	2.50	13.33	2.73	18.56	6.19
720045	10.00	20.00	10.00	40.00	13.33
676004	2.78	4.00	4.55	11.33	3.78
720071	1.18	6.00	5.29	12.47	4.16
285378.27	2.35	3.00	7.33	12.68	4.23
720097	4.00	3.64	3.85	11.49	3.83
676103	0.95	3.33	6.67	10.95	3.65
FS1	10.00	7.50	13.57	31.07	10.36
Igorota	7.06	10.00	13.33	30.39	10.13
Ganza	3.60	13.75	10.40	27.75	9.25
TOTAL	136.33	148.64	219.55	504.52	168.17
MEAN	6.82	7.43	10.78	25.23	8.41

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	318.235	159.235			
Treatment	19	4,237.563	223.030	5.15**	1.85	2.40
Error	38	1,559.963	43.332			
TOTAL	59	6,115.996				

** – Highly significant

Coefficient of Variation = 68.64 %
Standard Error = 6.58

APPENDIX TABLE 20. Total weight of tubers (g/plants)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
384558.10	83.16	72.50	144.00	299.66	99.89
380251.17	63.04	52.95	149.41	265.37	88.46
IP84007.67	86.00	61.50	17800	325.50	108.50
285411.22	28.63	22.35	28.05	79.03	26.34
676070	78.00	87.62	10.25	175.87	58.62
387443.22	45.83	61.43	14.17	121.43	40.48
387039.15	212.27	123.64	131.00	466.91	155.64
676008	21.00	21.67	4.00	46.67	15.56
387410.7	18.58	60.00	31.00	109.58	36.53
575003	22.67	38.89	357.00	418.56	139.52
15.97.8	15.00	60.00	13.64	88.64	29.55
720045	54.00	90.00	56.00	200.00	66.67
676004	19.45	20.67	59.10	99.22	33.07
720071	8.24	25.00	10.00	43.24	14.41
285378.27	26.47	37.00	30.00	93.47	31.16
720097	20.67	24.55	56.16	101.38	33.79
676103	2.37	10.00	20.00	32.37	10.79
FS1	30.56	22.50	43.43	99.49	33.16
Igorota	27.65	22.00	23.33	72.98	24.33
Ganza	49.60	74.40	76.40	200.38	66.79
TOTAL	913.19	988.62	1,437.94	3,339.75	1,113.26
MEAN	45.66	49.43	71.90	166.99	55.67

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	10,475.626	5,237.813			
Treatment	19	101,199.001	5,326.263	2.15*	1.85	2.40
Error	38	88,993.575	2,472.044			
TOTAL	59	200,668.202				

* – Significant

Coefficient of Variation = 88.56 %

Standard Error = 49.72

APPENDIX TABLE 21. Dry matter content (DMC) of tubers

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
384558.10	31.1	26.3	29.2	86.6	28.87
380251.17	26.0	28.3	32.4	86.7	28.90
IP84007.67	29.4	21.8	28.4	79.6	26.53
285411.22	25.5	20.0	19.8	65.3	21.77
676070	21.6	20.5	24.4	66.5	22.17
387443.22	19.7	31.4	36.4	87.5	29.17
387039.15	16.4	18.8	24.3	59.5	19.83
676008	19.1	19.8	29.7	68.6	22.87
387410.7	17.3	24.0	22.3	63.6	21.20
575003	20.0	18.6	23.0	61.6	20.53
15.97.8	17.3	19.6	17.8	54.7	18.23
720045	16.0	19.2	20.3	55.5	18.50
676004	25.2	33.2	25.4	83.8	27.93
720071	28.5	24.1	14.5	67.1	22.37
285378.27	23.1	27.7	19.7	70.5	23.50
720097	16.0	11.5	21.0	48.5	16.17
676103	6.8	6.5	7.0	20.3	6.77
FS1	29.5	26.1	27.1	82.7	27.57
Igorota	23.8	19.7	24.0	67.5	22.50
Ganza	20.0	30.3	19.6	69.9	23.30
TOTAL	432.30	447.40	466.30	1,346.00	448.60
MEAN	21.62	22.37	23.32	67.30	22.43

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	29.020	14.540			
Treatment	19	1,602.820	84.359	4.73**	1.85	2.40
Error	38	677.233	17.822			
TOTAL	59	2,309.073				

** – Highly significant

Coefficient of Variation = 18.82 %
Standard Error = 4.22

APPENDIX TABLE 22. Harvest index

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
384558.10	0.37	0.29	0.29	0.95	0.32
380251.17	0.35	0.34	0.39	1.08	0.36
IP84007.67	0.31	0.24	0.27	0.82	0.27
285411.22	0.28	0.25	0.24	0.77	0.26
676070	0.23	0.22	0.25	0.70	0.23
387443.22	0.23	0.28	0.31	0.82	0.27
387039.15	0.20	0.23	0.28	0.71	0.24
676008	0.20	0.20	0.26	0.66	0.22
387410.7	0.28	0.34	0.34	0.96	0.32
575003	0.19	0.23	0.24	0.66	0.22
15.97.8	0.17	0.27	0.18	0.62	0.21
720045	0.20	0.21	0.21	0.62	0.21
676004	0.28	0.34	0.29	0.91	0.30
720071	0.35	0.31	0.22	0.88	0.29
285378.27	0.29	0.41	0.29	0.99	0.33
720097	0.21	0.17	0.26	0.64	0.21
676103	0.11	0.13	0.11	0.35	0.12
FS1	0.35	0.33	0.35	1.03	0.34
Igorota	0.27	0.26	0.28	0.81	0.27
Ganza	0.27	0.36	0.31	0.94	0.31
TOTAL	5.14	5.41	5.37	15.92	5.40
MEAN	0.26	0.27	0.28	0.80	0.27

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULATED F	
					0.05	0.01
Block	2	0.002	0.001			
Treatment	19	0.202	0.011	7.26**	1.85	2.40
Error	38	0.056	0.001			
TOTAL	59	0.259				

** – Highly significant

Coefficient of Variation = 14.42 %
Standard Error = 0.04