BIBLIOGRAPHY

CAMBONG, ROSENDA T. APRIL 2007. Response of Organically Grown Potato Entries Intercropped with Bush Beans and Onion Leeks. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

The study aimed to identify the most suitable cropping system for potato under organic production, identify the best potato entry that can be grown organically under La Trinidad condition, determine the interaction between the potato entries and cropping systems, and determine the economic benefit of growing different potato entries organically and intercropped with bush beans and onion leeks.

Based on the results, monocropping of potatoes produced the highest yield. Potatoes intercropped with bush beans also produced high yield.

Among the potato entries, 5.19.2.2, 13.1.1 and 96-06 were the most resistant to leafminer and late blight and produced the highest yield. These entries were also vigorous and had wide canopies.

To effect maximum yield, monocropping of entries 5.19.2.2, 13.1.1 and 96-06 is best.

The highest ROCE was obtained from growing potatoes intercropped with bush beans. Although intercropped potatoes had lesser yield than monocrop, income from the intercrop supplemented the gross income, thus resulting to higher ROCE.

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INTRODUCTION

Potato (*Solanum tuberosum* L.) is an important agricultural crop in terms of nutritional and economic value (FRLD, 1995). In fact, the potato tuber contains protein, minerals and vitamins. Potato production also provides a high profit to the farmers due to its many uses. Potatoes may be used as substitute for rice, source of starch, animal feeds, chips and other derivatives (CIP, 1984).

As agricultural modernization progressed, potatoes are grown under conventional farming where excessive cultivation, use of chemicals and synthetic fertilizers are practiced. Such practices often lead to reduced soil productivity, loss of organic matter, growing pest resistance to pesticides, low yield and others.

Potato intercropping might be an alternative solution to help alleviate such problems. Intercropping is the growing of two or more crops simultaneously in alternate rows in the same field. It may provide higher yield, reduced soil erosion and degradation, and lesser pest and disease incidence. In other countries, potatoes were intercropped with Faba beans and corn. As a result, the potatoes had higher yield (Roder *et al.*, 1992). Thus, intercropping of potatoes in Benguet might be worthwhile to study.

Furthermore, potatoes which are organically grown may also help in the build-up of soil fertility, reduction of pest and disease incidence, increased yield and profit. However, varieties suitable to organic farming are not yet identified. Thus, evaluation and selection of the appropriate variety must be considered for a profitable farming enterprise.

The study was conducted to:

1. identify the most suitable cropping system for potato under organic production;

2. determine the best potato entry that can be grown organically under La Trinidad condition;

3. determine the interaction between the potato entries and different cropping systems; and

4. determine the economic benefit of growing different potato entries organically and intercropped with bush beans and onion leeks.

The study was conducted at Benguet State University, Balili, La Trinidad, Benguet from November 2006 to February 2007.

REVIEW OF LITERATURE

Description of Intercropping

Intercropping is the growing of two or more crops simultaneously in alternate rows or separate rows on the same field. It is practiced to avoid total crop failure, to maximize productivity, and to supply the need of the farm family (Gupta, 1986).

Intercropping is one way of conserving natural resources, improving soil fertility, and protecting the land from soil erosion. A good cropping system also make more efficient use of the environment, considering that space, light, moisture and nutrients are available anytime (Beets, 1982).

Effects of Intercropping

Intercropping either onion or garlic in between double rows of potato did not significantly affect the growth and yield of potato. Moreover, higher return per peso invested was obtained and less infestation of insect was observed (Mangaser *et al*., 1985).

Intercropping potato with corn or cowpea, had significantly reduced the marketable yield of potato. This unfavorable effect obtained was caused by complete shading of the intercrop used (Mangaser *et al.,* 1985).

Generally, individual crop yield decreased when intercropped, but total productivity is higher than monoculture. Total dry matter production is closely related to leaf area and the dry matter accumulation per unit leaf area of intercropped corn and rice (Gupta, 1986).

Intercropping two or more crops does not only increase income but also accounts much in reducing or controlling insect and disease in the main crop. In addition, the yield of potato was not affected by the different intercrops (e.g. celery, lettuce, onion leeks, and

carrot) due to the larger canopy, longer stem as well as its root system. As an example, intercropping lettuce and onion leeks with potato has the highest yield; less yield was obtained from onion leeks only (Fernandez, 1981).

Intercropping techniques can maximize production per unit area per year. Multiple cropping accompanied by proper fertilizer application will result in more efficient use of land area and sunlight, consequently greater total outputs (Bautista, 1983).

Legumes as Intercrop

Legumes are good for intercropping purposes despite the low nutrient consumption. In addition, legumes supply nitrogen to the soil because it is associated with nitrogen-fixing bacteria.

Legumes as intercrop can capture light that filters down through the canopy to shade the ground. The shading discourages weeds from growing (Bautista, 1983).

Onion Leeks as Intercrop

Onion leeks (*Allium fistolum* L.) is a widely grown vegetable that belongs to the genus *Alium*. Almost all the parts of plant is strongly flavored and has a sharp odor. The bulb does not develop and the neck of the bulbous root remains thick according to Dow (1984) as cited by Aya-os (2003). It may be propagated by divisions of the bulb or by seeds.

Onion leeks ranks as one of the world's most popular food cooked and dehydrated (Hudges, 1990).

Management in an Intercrop Combination

Many combination of crops have been grown or experimented as mixed or relay intercrops. Some of these include sunflowers grown with black lentils, wheat with flax and others that thrive in many places (Toyan, 2003).

Farmers do combination of crops especially with the limited area. Mixed cropping usually done in high land includes strawberry grown with onions and others (Toyan, 2003).

Planning fertilization of intercrops can be challenging, as the full needs of both crops must be met. Generally, there is little information available on how to go about this. One possibility would be to ask for soil test for each crop separately, then formulate a recommendation that will cover the needs of both crops to be grown. Such recommendations are generally 10% to 30% higher than rates for individual crops (Thorne, 1979).

Weed and pest needs in intercrop will likely be different from those in monocropping. Some disease incidence, such as a soybean or mungbean rust, may increase when aggravated with high corn population and over fertilization. In many cases, insect pest population is lower when two or more crops are grown together (Altiere, 1994).

Importance of Organic Fertilizer

White (2004) as cited by Balas (2006) states 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 nutrients and to control insects and diseases and weeds.

Organic manure can increase the proportion of water stable aggregates and increase water holding capacity of the soil. The addition of organic manure can also counteract the harmful effect of continuous use of inorganic fertilizers on soil bulk density. The improved physical condition of soils resulting from the addition of organic matter may increase crop yield as compared to using the same rates of inorganic fertilizer alone (Pears, 2005).

Organic material addition also increases soil cation exchange capacity. An increase in total C is noticed especially in flooded soils, while an increase in potentially available N can be expected with the application of organic matter. Phosphorous availability is increased by organic manure, which are also good sources of micronutrients (Eusebio, 2001). Moreover, soil fed in this way tends to produce healthier plants that are better able to withstand attack from pest and disease, or have much better chance of recovery (Pears, 2005).

Green manures are plants grown to improve the soil, rather than for food or ornament. The beneficial characteristics include N-fixing, dense foliage for weed suppression and or penetrative roots, ideal for opening up heavy soil and improving light soils (Pears, 2005).

Organic fertilizer can be used where necessary to supply additional nutrients to the soil, other mineral-based compounds can be used to change the pH of the soil. Organic gardening also emphasizes on soil health and our own health (Pears, 2005).

MATERIALS AND METHODS

An area of 315m^2 was cleaned, cultivated and divided into three blocks representing three replications (Figure 1). Each block consisted of 21 plots measuring 1 x 5 m^2. Each plot was planted with potato tuberlets previously produced from a greenhouse.

The treatments were laid out using split-plot design as follows:

Main plot: (Cropping Systems)

CODE	CROPPING SYSTEM
CS_0	Potato alone
CS_1	Potato + Bush bean
CS_2	Potato + Onion leaks

Sub plot: (Potato Entries)

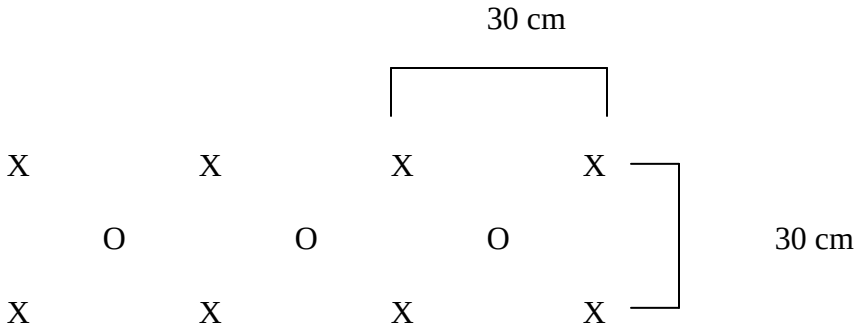
CODE	ENTRY	SOURCE
PA_1	13.1.1	CIP, Peru
PA_2	387021.17 (96.06	CIP, Peru
PA_3	573275	CIP, Peru
PA_4	5.19.2.2	Philippines
PA_5	676089	CIP, Peru
PA_6	Ganza	CIP, Peru
PA_7	Granola	Germany

One tuberlet per hill was planted at a distance of 30 cm x 30 cm between rows and hills. Bush bean seeds and onion, on the other hand, were planted in between rows of potato as shown in the diagram:

Figure 1. Overview of the area at Balili, La Trinidad

Legend: x – Potato O – Bush bean or onion

Illustration:



The plants were equally applied with compost. All cultural management such as irrigation, hilling-up, pest control, and weeding were employed for better plant growth.

The data gathered were the following:

I. Potato

A. Growth Performance

1. Plant survival (%). The number of plants that survived was taken 30 days after planting and computed using the formula:

$$\% \text{ Survival} = \frac{\text{Number of surviving plants}}{\text{Total number of plants sown}} \text{ X } 100$$

2. Plant vigor. This was taken at 30, 45, 60 and 70 days after planting (DAP) using the CIP rating scale (Palamor *et al*., 1994):

SCALE	DESCRIPTION	REMARKS
1	Plants are weak with few stems and leaves; very pale	Poor vigor
2	Plants are weak with few thin stems and leaves: pale	Less vigor
3	Better than less vigor	Vigorous

4	Plants are moderately strong with robust stem and leaves; light green in color	Moderately vigorous
5	Plants are strong with robust stems, leaves; leaves are light to dark green in color	Highly vigorous

3. Canopy cover. This was gathered at 30, 45, 60 and 70 DAP using a wooden frame measuring 120 x 60 cm having equally-sized 12 x 16 grids. Grids covered with effective leaves were counted.

4. Height maturity (cm). The height of the plants were measured before harvest using ten sample plants per plot. Plants were measured from the base to the tip of the tallest shoot.

B. Pest and Disease Incidence

1. Leaf miner incidence. This was recorded by observing the appearance of leaf miner at 30, 40, 60 and 75 DAP using the following scale (CIP, 2001):

SCALE	DESCRIPTION	REMARKS
1	Less than 20% of plants per plot infected	Highly resistant
2	21 – 40% of plants per plot infected	Moderately resistant
3	41 – 60% of plants per plot infected	Susceptible
4	61 – 80% of plants per plot infected	Moderately susceptible
5	81 – 100% of plants per plot infected	Very susceptible

2. Late blight incidence. Late blight was observed during the growth stage of the plant at 30, 45, 60 and 75 DAP using the following rating scale (Henfling, 1987):

BLIGHT (%)	CIP SCALE	DESCRIPTION
0	1	No late blight observable
Traces - < 5	2	Late blight present. Maximum 10 lesions per plant.
5 - < 15	3	Plants look healthy, but lesions are easily seen at closer distance. Maximum foliage area affected by lesions or destroyed corresponds to no more than 20 leaflets
15 - < 35	4	Late blight easily seen on most plants. About 25% of foliage is covered with lesions or destroyed.
35 - < 65	5	Plot looks green; however, all plants are affected. Lower leaves are dead. About half the foliage of the plants destroyed.
65 - < 85	6	Plot looks green with brown flecks. About 75% of each plant is affected. Leaves of the lower half of the plants destroyed.
85 - < 95	7	Plot neither predominantly green nor brown. Only top leaves are green. Many stems have large lesions.
95 - < 100	8	Plot is brown-colored. A few top leaves still have green areas. Most have lesions or are dead.
100	9	All leaves and stems dead

Description: 1 – Highly resistant; 2-3 Resistant; 4-5 Moderately resistant; 6-7 Moderately susceptible; 8-9 Susceptible

C. Yield and Yield Components

1. Number and weight of marketable tubers per plot (kg). All tubers with marketable quality were counted and weighed.

2. Number and weight of non-marketable tubers per plot (kg). All tubers that were malformed, damaged by pest and disease, injured with greening etc. were counted and weighed.

3. Total yield per plot (kg). The total weight of marketable and non-marketable tubers were taken.

4. Computed yield (ton/ha). This was computed using the formula:

$$\text{Yield (tons/ha)} = \frac{\text{Total yield per plot}}{\text{Plot size } (m^2)} \text{ X } 10{,}000$$

D. Return on cash expense. This was computed by dividing the net profit over the total cost of production multiplied by 100.

$$\text{ROCE} = \frac{\text{Net Profit}}{\text{Total cost of production}} \text{ X } 100$$

E. Chemical properties of the soil. The pH, organic matter, nitrogen, phosphorus and potassium of the soil were gathered before planting and after harvesting through soil analysis at the Bureau of Soils, Pacdal, Baguio City.

F. Meteorological data. The temperature, relative humidity and rainfall of the area were taken from Benguet State University PAG-ASA.

II. Bush Bean

1. Weight of marketable pods per plot (kg). All pods without damage were weighed during harvest time.

2. Weight of non-marketable pods (kg). Weight of pods which were short, abnormal, over matured and damaged by pest and diseased were taken.

3. Total yield per plot (kg). Total weight of pods harvested per plot was measured.

III. Onion Leeks

1. Weight of suitable planting materials per plot (kg). All leaves with marketable quality were weighed during harvest time.

2. Weight of unsuitable planting materials per plot (kg). All leaves with marketable quality were weighed during harvest time.

3. Total weight of planting materials per plot (kg). Weight of suitable and unsuitable planting materials were taken.

RESULTS AND DISCUSSION

Meteorological Data

The temperature in the site, which ranged from 18.1^{0}C to 20.6^{0}C was well within the optimum temperature range (17-22^{0}C) for potatoes (NPRCRTC, N. D.).

The relative humidity ranged from 77 to 80% during the conduct of the study (Table 1). The rainfall also ranged from 0.03 mm to 2.5 mm. Highest rainfall was observed during the months of November to December. Sunshine duration was highest in February and lowest in November.

These environmental factors may greatly affect the yield of potatoes. For instance, relative humidity must be 86% or lower for better yield and tuber development. Light intensity must also be enough to positively affect photosynthesis and yield of potatoes (NPRCRTC, N.D.).

Table 1. Temperature, relative humidity, rainfall amount, and sunshine duration at Balili, La Trinidad from November to February

MONTH	TEMPERATURE ^{0}C			RELATIVE HUMIDITY (%)	RAINFALL AMOUNT (mm)	SUNSHINE DURATION (minutes)
	MAX	MIN	MEAN			
November	23.5	15.2	19.4	80	2.5	381.4
December	24.5	16.6	20.55	78	2.5	387.0
January	23.9	13.9	18.9	77	0.03	386.6
February	23.6	12.6	18.1	77	0	521.6
MEAN	23.8	16.33	20.07	78	1.26	419.15

Soil Chemical Properties

Soil analysis is very important to determine the ideal texture and physical nature of the soil that may influence the yield, shape and general appearance of the tubers (NPRCRTC, N. D.).

The relative high pH of the soil might be attributed to the organic matter present in the soil (Table 2). Ample supply of organic matter helps to keep the soil loose, enables roots of crops to penetrate, and increase soil water holding capacity (NPRCRTC, N. D.).

Nitrogen, phosphorous, and potassium are required for growing potatoes. Potato is best grown in soils with 120-120-120 NPK kg/ha and a pH of 5.5 – 6.0 (NPRCRTC, N. D.). The soil in Balili have low amounts of N and P which may be supplied with organic fertilizers such as compost to effect maximum yield.

Table 2. Initial chemical properties of the soil at Balili, La Trinidad

pH	ORGANIC MATTER (%)	NITROGEN (%)	PHOSPHOROUS (ppm)	POTASSIUM (ppm)
6.72	2.5	0.125	90	312

Plant Survival

Effect of cropping system. No significant differences were observed on the plant survival of potatoes planted under different cropping systems. Plant survival was highest in potatoes intercropped with onions (Table 3).

Effect of potato entry. Highly significant differences were observed in the plant survival of the potato entries used. Entry 13.1.1 had the highest survival but comparable with entries 5.19.2.2 and 96-06. Plant survival may be affected by factors such as emergence and sprout size. Small sprouts at planting may delay emergence from the

ground (CIP, 1984) and thus, decrease plant survival. Entry 573275 with the lowest survival may have emerged late.

Table 3. Plant survival of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	PLANT SURVIVAL (%) 30 DAP
Cropping systems (CS)	
Potato alone	73
Potato + Beans	76
Potato + Onions	79
Potato entries (PE)	
13.1.1	99[a]
96-06	87[ab]
573275	21[c]
5.19.2.2	96[a]
676089	77[b]
Ganza	77[b]
Granola	74[b]
CS x PE	**
CV(a)%	13.49
CV(b)%	13.59

Means followed by common letters are not significantly different at 5% level by DMRT

Interaction effect. The interaction between the cropping systems and potato entries were highly significant in terms of plant survival (Figure 2). Entries 13.1.1 and 96-06 intercropped with bush beans and onions had the highest plant survival. Higher plant survival might have been brought about by wider spaces between potato plants (Gupta**,** 1986).

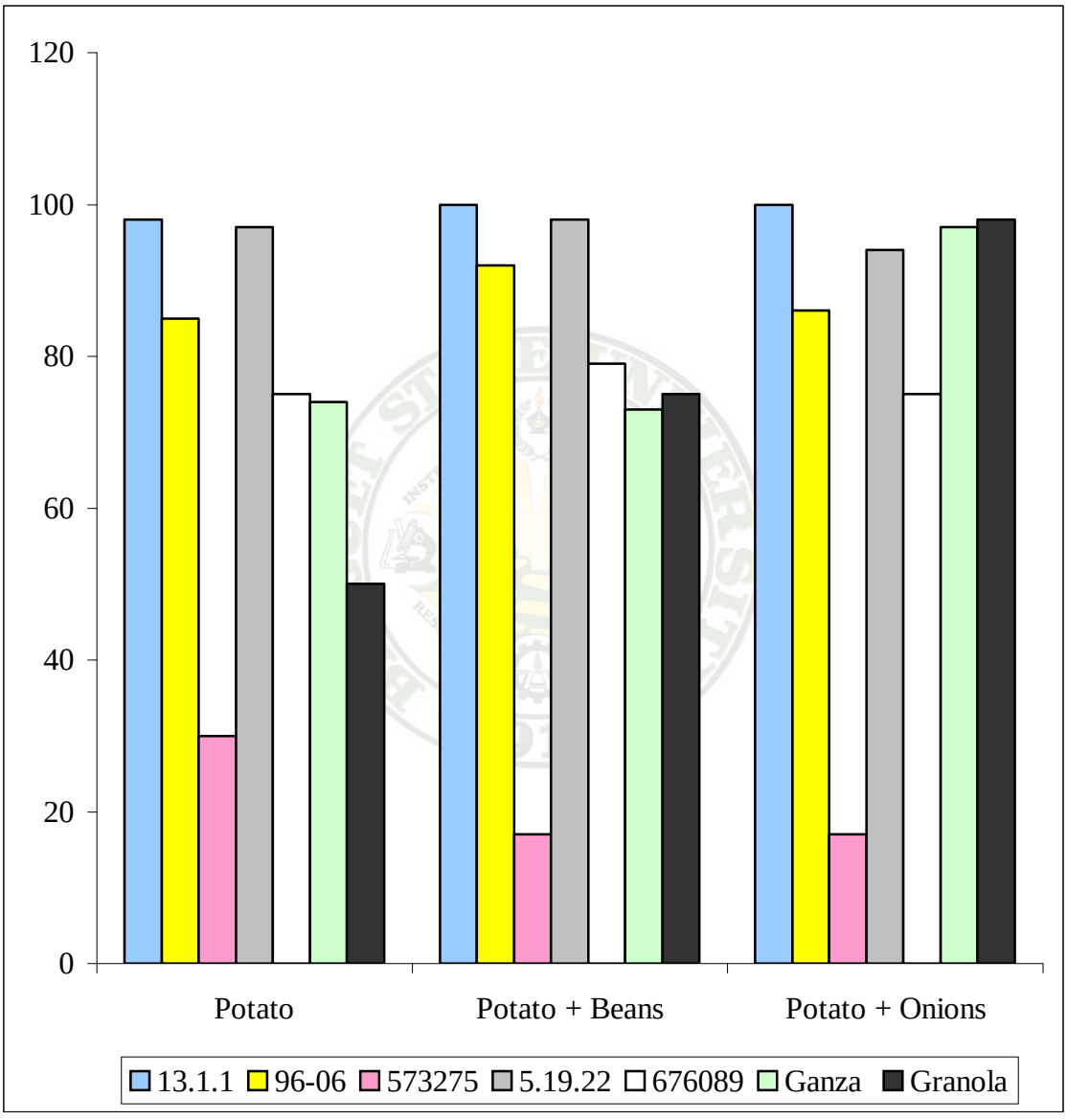


Figure 2. Plant survival of organically grown potato entries intercropped with bush beans and onion leeks

Plant Vigor

Effect of cropping system. There were no significant differences in the plant vigor of potatoes grown under different cropping systems at 30, 45, 60 and 75 DAP (Table 4). The plants grown under different cropping systems were vigorous to moderately vigorous.

Table 4. Plant vigor at 30, 45, 60 and 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	PLANT VIGOR (DAP)			
	30	45	60	75
Cropping systems (CS)				
Potato alone	4	4	4	4
Potato + Beans	3	4	4	4
Potato + Onions	3	4	4	4
Potato entries (PE)				
13.1.1	4^{a}	5^{a}	5^{a}	4^{b}
96-06	3^{ab}	5^{a}	5^{a}	4^{b}
573275	2^{b}	3^{c}	4^{b}	4^{b}
5.19.2.2	4^{a}	5^{a}	5^{a}	5^{a}
676089	3^{ab}	4^{b}	5^{a}	5^{a}
Ganza	3^{ab}	4^{b}	4^{b}	4^{b}
Granola	2^{b}	3^{c}	2^{c}	0^{c}
CS x PE	ns	ns	ns	ns
CV(a)%	20.18	10.79	8.39	38.06
CV(b)%	19.21	11.10	7.37	38.94

Means followed by common letters are not significantly different at 5% level by DMRT.
Rating Scale: 1 – Poor vigor 3 - Moderately Vigorous 5 – Highly Vigorous
2 – Less vigor 4 - Vigorous

Effect of potato entry. Highly significant differences are observed in the plant vigor of the different entries. Entries 13.1.1, 5.19.2.2 and 676089 had consistently moderate to high vigor. Granola, on the other hand, had less to poor vigor at 75 DAP.

High plant vigor in some entries may be due to resistance to late blight and wide canopy. Poor vigor in Granola may be due to susceptibility to late blight.

Interaction effect. The interaction between cropping systems and potato entries did not significantly differ in terms of plant vigor.

Canopy Cover

Effect of cropping system. There were no significant differences obtained in the canopy cover of the potatoes grown under different cropping systems. Wider canopy was observed in the potatoes intercropped with beans and onion leeks at 60 and 75 DAP (Table 5). Intercropping may widen canopy in main crops due to wider spaces (Fernandez, 1981).

Effect of potato entry. Canopy cover among the potato entries was highly significant. Canopy cover of all entries increased until 60 DAP but decreased at 75 DAP which may be due to infection of late blight.

Widest canopy was also exhibited by entry 5.19.2.2 but comparable with the canopy of entries 13.1.1 and 96-06. Wide canopy cover of these entries may indicate resistance to late blight.

Granola with the narrowest canopy was found to be very susceptible to leafminer.

Interaction effect. There was no significant interaction observed in the canopy of potatoes and cropping systems at 30, 45, and 60 DAP. However, significant interaction is observed in the canopy of potatoes at 75 DAP (Figure 3). Entry 13.1.1 intercropped with

bush beans had the widest canopy. The intercrop may have served as alternative host to leafminer and late blight thus, not affecting the canopy of the potato plants.

Table 5. Canopy cover at 30, 45, 60 and 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	CANOPY COVER (DAP)			
	30	45	60	75
Cropping systems (CS)				
Potato alone	20	31	42	26
Potato + Beans	11	22	44	29
Potato + Onions	12	24	44	29
Potato entries (PE)				
13.1.1	23[a]	38[a]	57[ab]	38[ab]
96-06	24[a]	41[a]	61[a]	39[ab]
573275	4[b]	11[c]	23[d]	15[d]
5.19.2.2	24[a]	38[a]	65[a]	44[a]
676089	12[b]	26[b]	47[bc]	34[bc]
Ganza	10[b]	19[bc]	40[c]	26[c]
Granola	5[b]	9[c]	10[d]	0[e]
CS x PE	ns	ns	ns	**
CV(a)%	35.99	23.40	18.45	18.93
CV(b)%	34.93	22.89	16.93	19.16

Means followed by common letters are not significantly different at 5% level by DMRT

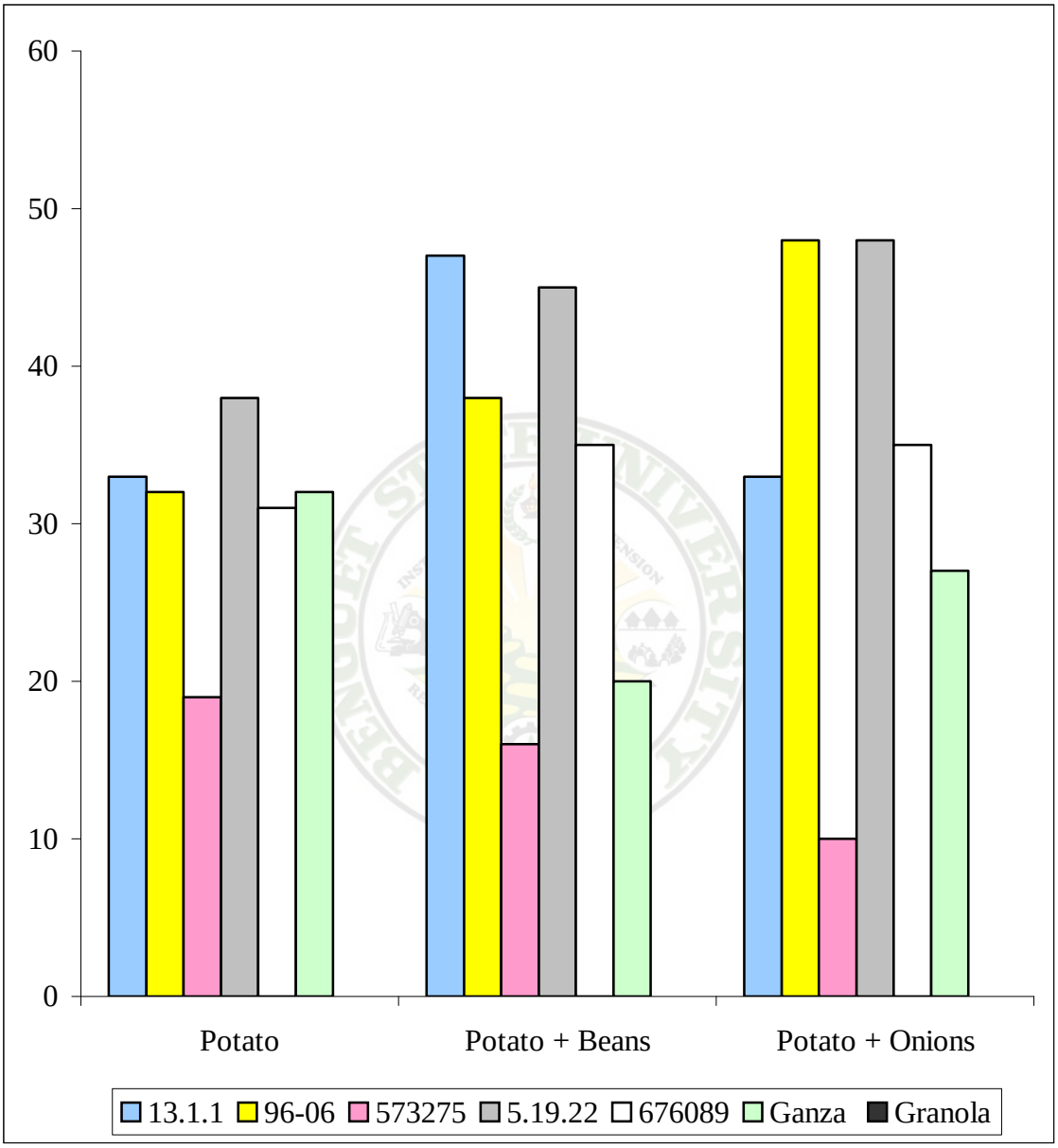


Figure 3. Canopy cover at 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

Plant Height

Effect of cropping system. There were no significant differences on the height of potatoes grown under different cropping systems. Potatoes intercropped with beans were the tallest, which might be due to wide canopy (Table 6).

Table 6. Height at 30 and 90 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	PLANT HEIGHT (cm)	
	30 DAP INITIAL	90 DAP FINAL
Cropping systems (CS)		
Potato alone	12.67	31.43
Potato + Beans	11.52	31.57
Potato + Onions	12.05	30.95
Potato entries (PE)		
13.1.1	17.78^{ab}	44.00^{ab}
96-06	12.33^{ab}	41.44^{bc}
573275	6.8^{ab}	33.33^{d}
5.19.2.2	19.89^{a}	48.44^{a}
676089	9.56^{ab}	36.78^{cd}
Ganza	5.44^{ab}	15.22^{e}
Granola	4.33^{b}	0.00^{f}
CS x Pe	ns	ns
CV(a)%	25.81	9.89
CV(b)%	24.97	9.71

Means followed by common letters are not significantly different at 5% level by DMRT

Effect of potato entry. Highly significant differences were observed among the potato entries in terms of their height at 30 and 90 DAP. Entry 5.19.2.2 had the tallest plant but comparable with 13.1.1. These entries had the widest canopy cover which might have led to increased plant height.

Granola was susceptible to leafminer leading to death of some plants and absence of final height.

Interaction effect. Cropping systems and potato entries had no significant interaction in terms of initial and final height.

Leaf Miner Incidence

Effect of cropping system. Plants grown under different cropping systems were all susceptible to leafminer at 75 DAP, which might be due to varying temperatures and relative humidity in the site.

Effect of potato entry. Entries 573275 and Ganza were moderately resistant to leafminer at 75 DAP (Table 7). Granola was moderately resistant during the early stages of growth but later became susceptible to leafminer. Resistance to pest in potatoes may be attributed to their genetic characteristics.

Table 7. Leaf miner rating at 30, 45, 60, and 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	LEAF MINER RATING			
	DAP			
	30	45	60	75
Cropping systems (CS)				
Potato alone	1	2	2	3
Potato + Beans	1	2	2	3
Potato + Onions	1	1	2	3
Potato Entries (PE)				
13.1.1	1	2	2	3
96-06	1	2	2	3
573275	1	2	2	2
5.19.2.2	1	1	2	3
676089	1	1	2	3
Ganza	1	1	2	2
Granola	2	2	2	5

Leaf miner rating scale: 1 - Highly resistant
2 – Moderately resistant
3 - Susceptible
4 – Moderately susceptible
5 – Very susceptible

Late Blight

Effect of cropping system. Potatoes grown under different cropping systems were highly resistant to late blight (Table 8). Late blight incidence is low which might be due to the relatively low relative humidity and rainfall during the conduct of the study.

Effect of potato entry. All of the potato entries were highly resistant except Granola which was resistant to late blight. Resistance among the accessions might be

Table 8. Late blight infection at 60 and 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	LATE BLIGHT RATING (%)	
	60 DAP	75 DAP
Cropping systems (CS)		
Potato alone	1	1
Potato + Beans	1	2
Potato + Onions	1	1
Potato entries (PE)		
13.1.1	1	1
96-06	1	1
573275	1	1
5.19.2.2	1	1
676089	1	1
Ganza	1	1
Granola	2	3

Late blight rating scale: 1 – Highly resistant
2-3 – Resistant
4-5 – Moderately resistant
6-7 – Moderately susceptible
8-9 - Susceptible

due to their genetic characteristics. Low incidence of late blight might also be due to the application of a bio-fungicide (Virtouso) at 30 DAP.

Haulm Weight

Effect of cropping system. No significant differences were observed on the haulm weight of potatoes grown under different cropping systems. Numerically, potato alone had the heaviest haulms which may be attributed to higher plant density (Table 9).

Table 9. Haulm weight of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	HAULM WEIGHT (g)
Cropping systems (CS)	
Potato alone	44.40
Potato + Beans	37.97
Potato + Onions	42.21
Potato entries (PE)	
13.1.1	41.88[b]
96-06	45.92[b]
573275	38.11[b]
5.19.2.2	70.60[a]
676089	52.89[b]
Ganza	38.20[b]
Granola	3.08[c]
CS x PE	**
CV(a)%	24.45
CV(b)%	24.37

Means followed by common letters are not significantly different at 5% level by DMRT

Effect of potato entry. Highly significant differences were observed on the haulm weight of the different potato entries. Entry 5.19.2.2 obtained the heaviest haulms which may be due to its wide canopy, high vigor, and resistance to leaf miner and late blight. Granola, on the other hand was susceptible to leafminer thus low haulm weight.

Interaction effect. The interaction between cropping systems and potato entries was highly significant. Monocropping of 5.19.2.2 had the highest haulm weight due to wide canopy (Figure 4).

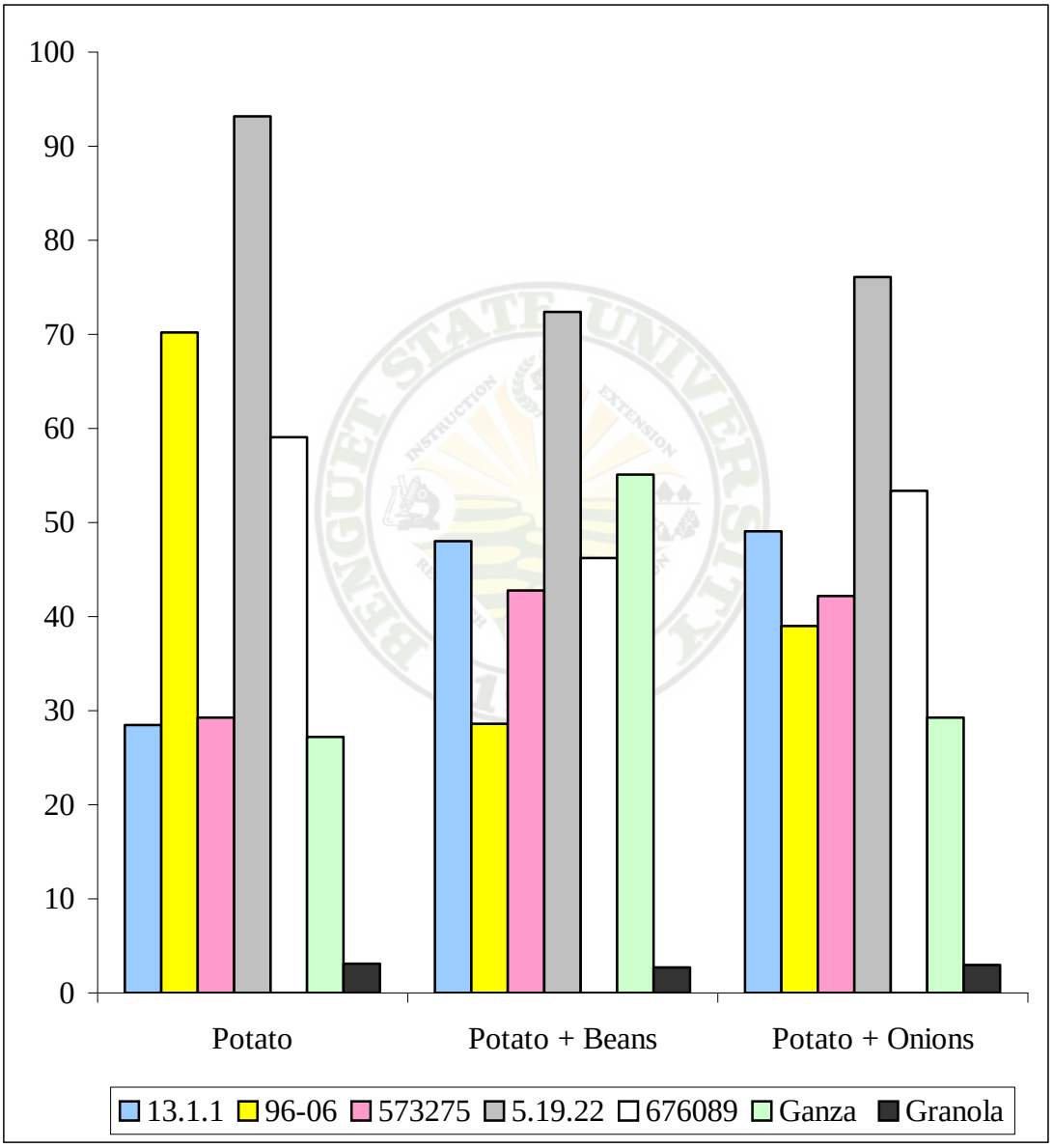


Figure 4. Haulm weight of organically grown potato entries intercropped with bush beans and onion leeks

Percent Hills Harvested

Effect of cropping system. No significant differences were observed on the percent hills harvested of plants grown under different cropping systems (Table 10). Percent hills harvested was highest in potatoes intercropped with beans (90%).

Table 10. Percent hills harvested of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	HILLS HARVESTED (%)
Cropping systems (CS)	
Potato alone	84
Potato + Beans	90
Potato + Onions	89
Potato entries (PE)	
13.1.1	100[a]
96-06	99[a]
573275	54[b]
5.19.2.2	99[a]
676089	98[a]
Ganza	99[a]
Granola	69[b]
CS x PE	**
CV(a)%	11.92
CV(b)%	11.17

Means followed by common letters are not significantly different at 5% level by DMRT

Effect of potato entry. Entry 13.1.1 had significantly the highest percent hills harvested but not different with the other entries except 573275 and Granola. Low percent hills harvested may be due to poor vigor and low plant survival.

Interaction effect. Interaction between cropping systems and potato entries was highly significant (Figure 5). Entries 5.19.2.2 intercropped with bush beans had the highest percent hills harvested. Intercropping of potatoes with other crops enhances productivity due to wider canopy and better root system (Fernandez, 1981).

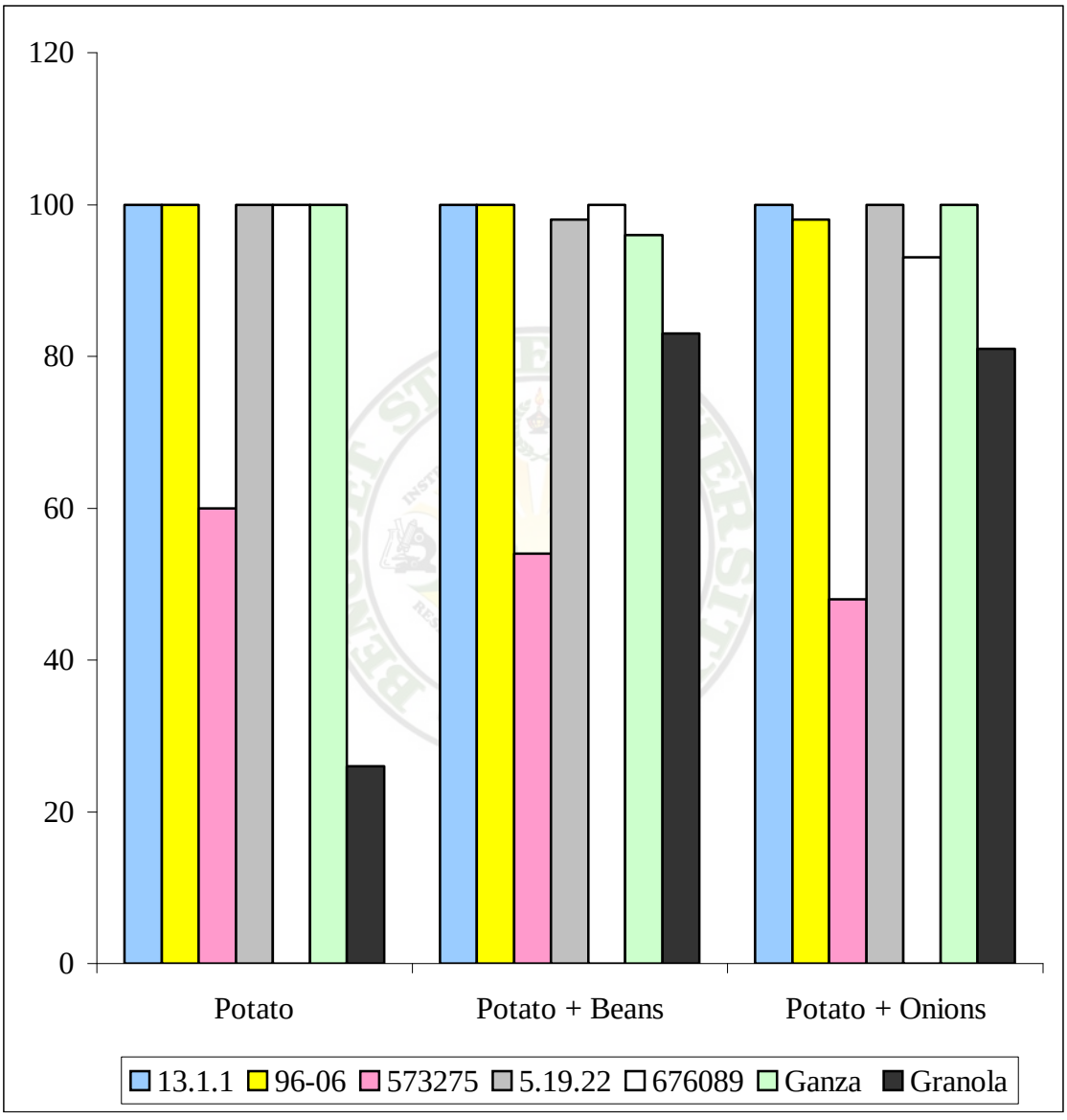


Figure 5. Percent hills harvested of organically grown potatoes intercropped with bush beans and onion leeks

Number of Marketable and Non-Marketable
Tubers Per Plot

Effect of cropping system. Potato alone obtained the highest number of large, medium, and marble-sized tubers while potato intercropped with beans had the highest number of small tubers (Table 11). Under intercropping conditions, potato plants produced only few and mostly small-sized tubers (Kuruppuarachchi, 1990).

No significant differences were observed on the number of non-marketable tubers of potatoes grown as monocrop and with intercrops.

Effect of potato entry. Entry 13.1.1 significantly obtained the highest number of XL, large, medium, and small tubers but comparable with the tubers of entries 96-06 and 5.19.2.2. High number of tubers of these entries may be due to high canopy cover, high plant survival and resistance to leafminer and late blight. Granola which had the lowest number of tubers, might be due to its poor vigor, narrow canopy, and susceptibility to leaf miner and late blight.

No significant differences were observed in the number of marble-sized and non-marketable tubers of the different entries.

Interaction effect. Interaction between cropping systems and potato entries was not significant in terms of the number of XL, medium, marble-sized and non-marketable tubers. Significant interaction was however observed in the number of large and small tubers of potatoes grown as monocrop and with intercrops (Figure 6 and 7). Entry 13.1.1 grown as monocrop obtained the highest number of large tubers. This result implies that both factors must be considered in growing potatoes with more number of tubers.

Table 11. Number of marketable and non-marketable tubers of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	MARKETABLE TUBERS					NON-MARKETABLE TUBERS
	XL	L	M	S	MS	
Cropping systems (CS)						
Potato alone	5	14[a]	24[a]	14[b]	15[a]	20
Potato + Beans	5	10[ab]	9[b]	23[a]	8[b]	17
Potato + Onions	5	8[b]	12[ab]	12[b]	5[b]	19
Potato entries (PE)						
13.1.1	9[a]	21[a]	27[a]	24[a]	16	18
96-06	7[ab]	14[ab]	21[a]	21[a]	9	28
573275	3[bc]	7[bc]	12[ab]	8[bc]	3	18
5.19.2.2	8[a]	13[ab]	19[a]	20[ab]	12	18
676089	3[bc]	10[b]	14[ab]	20[ab]	11	15
Ganza	5[ab]	9[bc]	13[ab]	18[ab]	9	21
Granola	0[c]	0[c]	0[b]	5[c]	5	12
CS x PE	ns	*	ns	**	ns	ns
CV(a)%	21.19	48.29	44.12	41.75	28.18	41.75
CV(b)%	24.66	49.32	28.49	41.11	22.24	34.25

Means followed by common letters are not significantly different at 5% level by DMRT

Legend: XL – extra large
L – large
M – medium
S – small
MS – marble-sized

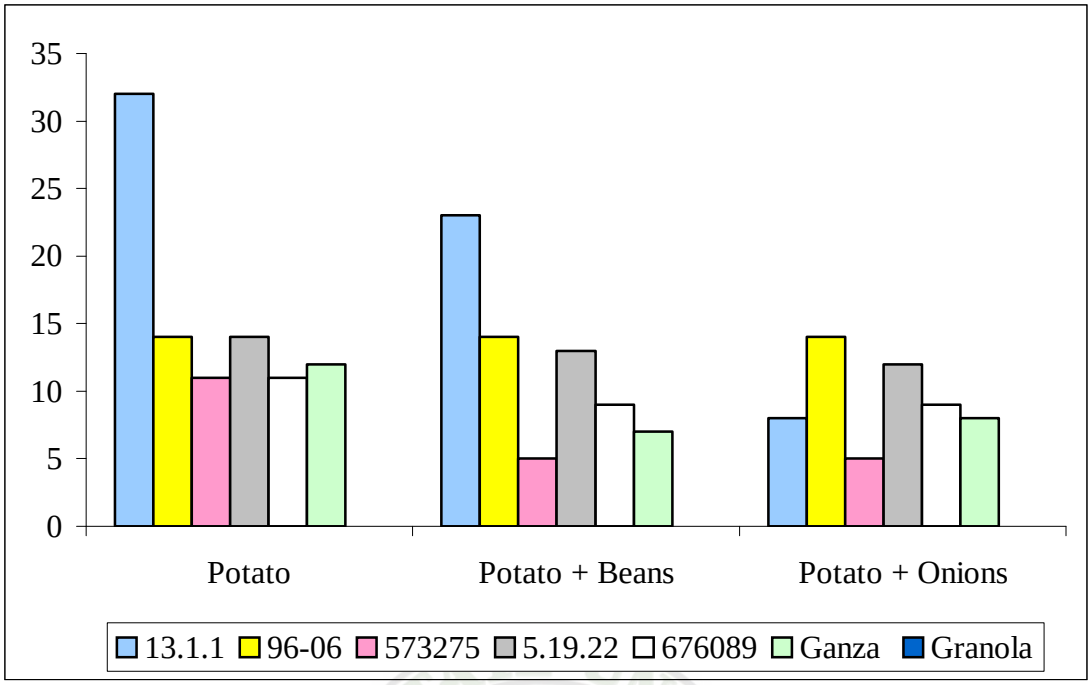


Figure 6. Number of large tubers of organically grown potatoes intercropped with bush beans and onion leeks

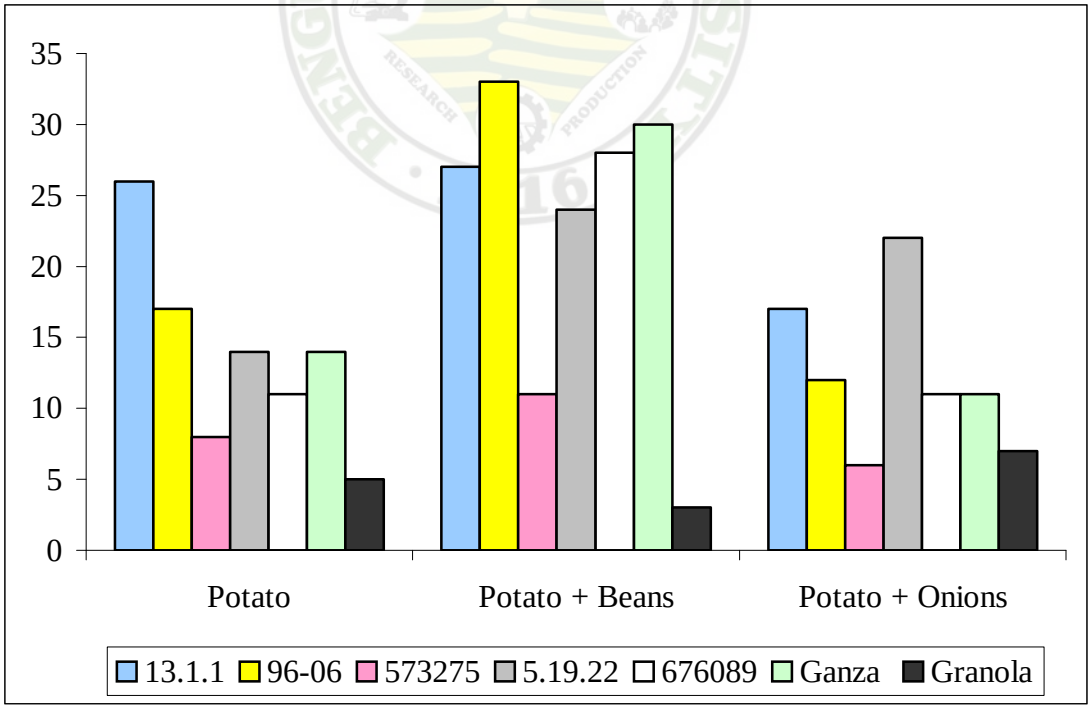


Figure 7. Number of small tubers of organically grown potatoes intercropped with bush beans and onion leeks

Weight of Marketable and Non-Marketable Tubers Per Plot

Effect of cropping system. No significant differences were observed on the weight of XL, medium, small, marble-sized, and non-marketable tubers of potatoes grown as monocrop and with intercrops (Table 12). However, potato alone significantly obtained the highest weight of large tubers but comparable with the tubers of potato intercropped with bush beans. Fig. 8 shows the tubers harvested from the different potato entries.

Effect of potato entry. Entries 5.19.2.2, 13.1.1 and 96-06 significantly obtained the heaviest XL and medium tubers (Figure 8). Granola obtained the lowest size of tubers probably due to its susceptibility to leafminer and poor vigor.

No significant differences were observed in the weight of small, marble-sized, and non-marketable tubers of the different accessions.

Interaction effect. No significant interaction was noted between the cropping systems and potato accessions on the weight of marketable and non-marketable tubers.

Table 12. Weight of marketable and non-marketable tubers of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	MARKETABLE TUBERS (kg/plot)					NON-MARKETABLE TUBERS (kg/plot)
	XL	L	M	S	MS	
Cropping systems (CS)						
Potato alone	0.46	0.76[a]	0.82	0.56	0.19	0.08
Potato + Beans	0.43	0.66[ab]	0.49	0.25	0.08	0.07
Potato + Onions	0.50	0.47[b]	0.45	0.36	0.06	0.07
Potato entries (PE)						
13.1.1	0.65[ab]	1.08[a]	0.88[a]	0.43	0.17	0.11
96-06	0.74[ab]	0.90[ab]	0.91[a]	0.50	0.13	0.11
573275	0.20[ab]	0.34[cd]	0.20[b]	0.16	0.04	0.12
5.19.2.2	0.80[a]	0.97[ab]	0.90[a]	0.55	0.28	0.04
676089	0.37[bcd]	0.63[abc]	0.77[a]	0.41	0.10	0.05
Ganza	0.48[abc]	0.50[bc]	0.45[ab]	0.37	0.09	0.05
Granola	0[d]	0[d]	0.10[b]	0.05	0.03	0.02
CS x PE	ns	ns	ns	ns	ns	ns
CV(a)%	36.19	45.01	25.80	27.33	38.69	20.94
CV(b)%	34.15	45.89	22.34	24.19	28.23	23.12

Means followed by common letters are not significantly different at 5% level by DMRT

Legend: XL – extra large
L – large
M – medium
S – small
MS – marble sized

Figure 8. Potato tubers of the different entries separated into different sizes

Total Yield Per Plot

Effect of cropping system. Potato alone significantly obtained the highest computed yield per plot but comparable with the yield of potatoes intercropped with bush beans (Table 13). High yield under these cropping systems is due to the higher weight of large and medium tubers. The bush beans may have also contributed to the nitrogen requirement of the potato plants, thus producing comparable yield.

Effect of potato entry. Entries 13.1.1, 96-06, and 5.19.2.2 significantly obtained the highest yield per plot. Lowest yield was obtained from Granola due to its susceptibility to leafminer and low number of tubers at harvest. Variations in yield are related to genetic characteristics of the entries (Midmore, 1990).

Interaction effect. The interaction between cropping systems and potato entries did not significantly affect total yield.

Computed Yield Tons Per Hectare

Effect of cropping system. Potato alone significantly obtained the highest computed yield per hectare due to higher number and weight of marketable tubers (Table 13). Potatoes intercropped with onions had the lowest yield per hectare.

Effect of potato entry. Highly significant differences were observed in the computed yield of the different potato entries. Entries 5.19.2.2, 13.1.1 and 96-06 obtained high computed yields per hectare due to their high total yield per plot, resistance to leafminer and late blight.

Interaction effect. Interaction between the cropping systems and potato entries did not significantly affect computed yield per hectare.

Table 13. Total yield and computed yield of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	TOTAL YIELD (kg/plot)	COMPUTED YIELD (t/ha)
Cropping systems (CS)		
Potato alone	2.81[a]	5.62[a]
Potato + Beans	2.00[ab]	4.01[ab]
Potato + Onions	1.80[b]	3.60[b]
Potato entries (PE)		
13.1.1	3.30[a]	6.61[a]
96-06	3.37[a]	6.75[a]
573275	0.97[cd]	1.95[cd]
5.19.2.2	3.51[a]	7.02[a]
676089	2.30[ab]	4.60[b]
Ganza	1.87[bc]	3.73[bc]
Granola	0.10[d]	0.21[d]
CS x PE	ns	ns
CV(a)%	36.19	24.90
CV(b)%	34.15	25.14

Means followed by common letters are not significantly different at 5% level by DMRT

Harvest Index

Effect of cropping system. No significant differences were obtained in the harvest index of potatoes grown as monocrop and with intercrops. Potato alone obtained the highest harvest index (Table 14).

Table 14. Harvest index of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	HARVEST INDEX
Cropping systems (CS)	
Potato alone	0.19
Potato + Beans	0.17
Potato + Onions	0.18
Potato entries (PE)	
13.1.1	0.20[ab]
96-06	0.20[ab]
573275	0.15[bc]
5.19.2.2	0.24[a]
676089	0.18[b]
Ganza	0.16[bc]
Granola	0.11[c]
CS x PA	ns
CV(a)%	8.29
CV(b)%	8.30

Means followed by common letters are not significantly different at 5% level by DMRT

Effect of potato entry. Significant differences were observed in the harvest index of the potato entries used. Entry 5.19.2.2 obtained the highest harvest index but comparable to the harvest index of 13.1.1 and 96-06. High harvest index of the entries may be related to their high yield. Granola on the other hand, had the lowest harvest index.

Interaction effect. There was no significant interaction observed between the cropping system and potato entries on harvest index.

Yield of Bush Beans and Onion Leeks Per Plot

Bush beans. Yield of bush beans per plot was low due to the attack of insects such as white flies, beetles, leaf miner and bean rust (Table 15). Bush bean may, however, be a good intercrop to potatoes due to the nitrogen it might contribute and the comparable yield of potatoes obtained (Table 13). The bush bean crop may also provide the farmers with a second marketable commodity that would help them diversify their production and meet nutritional requirements of their main crop (Beets, 1982).

Onion leeks. All onion leeks obtained were suitable as planting materials. However, using onion leeks as intercrops may not be best due to the low yield obtained in potatoes.

Table 15. Weight of marketable and non-marketable pods of bush beans per plot grown organically

	YIELD (kg)		
INTERCROP	MARKETABLE	NON-MARKETABLE	TOTAL
Bushbeans	1.20	0.72	1.92
Onions	2.05	0.00	2.05
CV(a)%	22.95	18.60	
CV(b)%	17.22	0.00	

Return on Cash Expense

Effect of cropping system. Potatoes intercropped with beans obtained the highest ROCE while potato alone obtained the lowest (Table 16). The lower yield in intercropped potatoes is supplemented by the sales from the intercrop.

Effect of potato entry. Entry 5.19.2.2 obtained the highest ROCE due to high yield of the plants. Entries 12.1.1 and 96-06 also obtained high ROCE while Granola obtained the lowest and negative ROCE. Negative ROCE in Granola is due to its low yield.

Table 16. Return on cash expense of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	TOTAL YIELD OF MARKETABLE TUBERS	VARIABLE COSTS (Php)	GROSS SALE (Php)	NET INCOME (Php)	ROCE (%)
Cropping systems (CS)					
Potato alone	2.79	91.13	111.60	20.47	22.46
Potato + beans	1.91	66.24	100.40	33.46	49.99
Potato + onions	1.84	65.03	94.10	29.07	44.70
Potato entries (PE)					
13.1.1	3.21	91.13	128.40	37.27	40.90
96-06	3.18	91.13	127.20	36.07	35.58
573275	0.94	91.13	37.60	-53.53	-58.74
519.2.2	3.50	91.13	140.00	48.87	53.63
676089	2.28	91.13	91.20	0.07	0.08
Ganza	1.89	91.13	75.60	15.53	-17.04
Granola	0.18	91.13	7.20	83.93	-92.10

Prevailing price:
Potato = Php 40.00/kg
Beans = Php 20.00/kg
Onion leeks = Php 10.00/kg

SUMMARY, CONCLUSIONS AND RECOMMENDATION

Summary

The study was conducted to identify the most suitable cropping system for potatoes under organic production; determine the best potato entry that can be grown organically under La Trinidad, Benguet condition; determine the interaction between potato entries and cropping systems; and determine the economic benefit of growing different potato entries organically and intercropped with bush beans and onion leeks.

Results of the study showed that the different cropping systems did not significantly affect plant survival, canopy cover, plant height, haulm weight, percent hills harvested, number and weight of XL, medium, small and marble-sized potato tubers, number and weight of non-marketable tubers, and harvest index. Potatoes grown as monocrop and with intercrops were all susceptible to leafminer at 75 DAP but resistant to late blight.

Significant differences among the cropping systems exist in the number of large, medium, small and marble-sized tubers, weight of marketable tubers, total yield per plot, and computed yield per hectare.

Potato intercropped with bush beans gained the highest ROCE while the lowest ROCE was obtained from potato alone.

Among the seven potato entries, significant differences were observed in plant survival, plant vigor, canopy cover, plant height, haulm weight, percent hills harvested, number of XL, large, medium and small tubers, weight of XL, large, medium tubers, total yield per plot, computed per hectare yield, and harvest index.

All potato entries were highly resistant to late blight except for granola which was only resistant to late blight. Most of the potato entries were susceptible to very susceptible to leafminer except entries 573275 and Ganza which were moderately resistant at 75 DAP.

Potato entries 5.19.2.2, 13.1.1, and 96-06 had the highest total and computed yield and ROCE.

Significant interaction between cropping systems and potato entries were noted in plant survival, canopy cover at 75 DAP, haulm weight, percent hills harvested, and number of large and small marketable tubers.

Conclusions

Based on the results, potato alone produced the highest yield but comparable with the yield of potatoes intercropped with beans. Bush beans might be a good intercrop to potato under organic production.

Among potato entries, 5.19.2.2, 13.1.1 and 96-06 were the best performers due to their high yield and resistance to leafminer and late blight.

The best treatment combination based on yield and resistance to pest is monocropping of entries 5.19.2.2, 13.1.1 and 96-06.

In terms of economic benefit, organic production of potatoes intercropped with bush beans is best to obtain high ROCE. The yield of intercropped potatoes is supplemented with the income from the intercrop, thus resulting to higher ROCE.

Recommendation

Based on the conditions of the study, monocropping of potatoes is recommended. Among the potato entries, 5.19.2.2, 13.1.1 and 96-06 are recommended for high yield and resistance to pest under organic production.

In terms of economic benefit, however, intercropping of potatoes with bush beans is recommended for higher ROCE.

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APPENDICES

APPENDIX TABLE 1. Plant survival of organically grown potato entries intercropped with bush beans and onion leeks (%)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	93	100	100	293	98
PE_2	87	90	77	254	85
PE_3	13	17	60	90	30
PE_4	97	97	97	291	97
PE_5	73	73	80	226	75
PE_6	77	77	67	221	74
PE_7	50	30	70	150	50
Sub - Total	490	484	551	1525	509
CS_1					
PE_1	100	100	100	300	100
PE_2	94	88	94	276	92
PE_3	25	13	13	51	17
PE_4	100	94	100	294	98
PE_5	75	81	81	237	79
PE_6	81	63	75	219	73
PE_7	69	81	75	225	75
Sub - Total	544	520	538	1602	534
CS_2					
PE_1	100	100	100	300	100
PE_2	88	94	75	257	86
PE_3	13	0	38	51	17
PE_4	100	100	81	281	94
PE_5	69	88	69	226	75
PE_6	75	88	88	251	97
PE_7	94	100	100	294	98
Sub – Total	539	570	551	1160	567
GRAND TOTAL	1583	1574	1640	4287	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	98	100	100	298	99[a]
PE_2	85	92	86	263	87[ab]
PE_3	30	17	17	64	21[c]
PE_4	97	98	94	289	96[a]
PE_5	75	79	75	229	77[b]
PE_6	74	73	97	244	77[b]
PE_7	50	75	98	223	74[b]
TOTAL	509	534	567	1610	
MEAN	73	76	79		76

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	140.41	70.21			
Cropping System (CS)	2	436.79	218.40	2.38[ns]	6.94	18.00
Error (a)	4	366.64	91.66			
Potato Entries (PE)	6	36641.87	6106.98	57.31**	2.36	3.35
CS x PE	12	3736.98	311.42	2.92**	2.03	2.75
Error (b)	36	3836.29	106.56			
TOTAL	62	45158.98				

C.V. (A)% = 13.49
C.V. (B)% = 13.59

** - highly significant
ns – not significant

APPENDIX TABLE 2. Plant vigor at 30 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	5	5	5	15	5
PE_2	5	4	3	12	4
PE_3	2	3	3	8	3
PE_4	5	5	4	14	5
PE_5	4	4	3	11	4
PE_6	3	4	4	11	4
PE_7	2	3	3	8	3
Sub - Total	26	28	25	79	28
CS_1					
PE_1	4	4	4	12	4
PE_2	3	3	3	9	3
PE_3	2	2	3	7	2
PE_4	5	4	3	12	4
PE_5	3	4	3	10	3
PE_6	3	4	3	10	3
PE_7	3	2	2	7	2
Sub - Total	23	23	21	67	21
CS_2					
PE_1	4	4	4	12	4
PE_2	4	3	3	10	3
PE_3	2	0	3	5	2
PE_4	5	4	3	12	4
PE_5	3	2	3	8	3
PE_6	4	3	3	10	3
PE_7	3	2	2	7	2
Sub – Total	25	18	21	64	21
GRAND TOTAL	74	69	67	210	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	5	4	4	13	4^a
PE_2	4	3	3	10	3^{ab}
PE_3	3	2	2	7	2^b
PE_4	5	4	4	13	4^a
PE_5	4	3	3	10	3^{ab}
PE_6	4	3	3	10	3^{ab}
PE_7	3	2	2	7	2^b
TOTAL	28	21	21	70	
MEAN	4	3	3		3

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	1.24	0.62			
Cropping System (CS)	2	6.00	3.00	3.60^{ns}	6.94	18.00
Error (a)	4	3.33	0.83			
Potato entries (PE)	6	34.67	5.78	14.09**	2.36	3.35
CS x PE	12	2.00	0.17	0.41^{ns}	2.03	2.75
Error (b)	36	14.76	0.41			
TOTAL	62	62.00				

C.V. (A)% = 20.18
C.V. (B)% = 19.21

** - highly significant
ns – not significant

APPENDIX TABLE 3. Plant vigor at 45 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	5	5	5	15	5
PE_2	5	5	4	14	5
PE_3	4	3	4	11	4
PE_4	5	5	5	15	5
PE_5	4	4	4	12	4
PE_6	5	5	4	14	5
PE_7	3	3	3	9	3
Sub - Total	31	30	29	90	31
CS_1					
PE_1	5	5	5	15	5
PE_2	5	4	4	13	4
PE_3	3	4	3	10	3
PE_4	5	4	4	14	5
PE_5	5	3	5	13	4
PE_6	4	4	4	12	4
PE_7	3	3	3	9	3
Su5b - Total	30	27	28	85	28
CS_2					
PE_1	5	4	5	14	5
PE_2	5	5	4	14	5
PE_3	3	3	4	10	3
PE_4	5	5	5	15	5
PE_5	4	4	4	12	4
PE_6	4	4	4	12	4
PE_7	3	3	3	9	3
Sub – Total	29	28	29	86	29
GRAND TOTAL	90	85	86	261	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	5	5	5	15	5^a
PE_2	5	4	5	14	5^a
PE_3	4	3	3	10	3^c
PE_4	5	5	5	15	5^a
PE_5	4	4	4	12	4^b
PE_6	5	4	4	13	4^b
PE_7	3	3	3	8	3^c
TOTAL	31	28	29	88	
MEAN	4	4	4		4

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
Replication	2	0.67	0.33			
Cropping System (CS)	2	0.67	0.33	3.5^{ns}	6.94	18.00
Error (a)	4	0.38	0.10			
Potato entries (PE)	6	26.38	4.40	20.78**	2.36	3.35
CS x PE	12	2.00	0.17	0.78^{ns}	2.03	2.75
Error (b)	36	7.62	0.21			
TOTAL	62	37.71				

C.V. (A)% = 10.79
C.V. (B)% = 11.10

** - highly significant
ns – not significant

APPENDIX TABLE 4. Plant vigor at 60 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	5	5	5	15	5
PE_2	5	5	4	14	5
PE_3	4	4	4	12	4
PE_4	5	5	5	15	5
PE_5	5	5	5	15	5
PE_6	5	5	4	14	5
PE_7	2	2	2	6	2
Sub - Total	31	31	29	91	31
CS_1					
PE_1	5	5	5	15	5
PE_2	5	5	4	14	5
PE_3	4	4	3	11	4
PE_4	5	5	5	15	5
PE_5	5	5	5	15	5
PE_6	5	4	4	13	4
PE_7	2	2	2	6	2
Sub - Total	31	30	28	89	30
CS_2					
PE_1	5	5	5	15	5
PE_2	5	5	5	15	5
PE_3	4	4	5	13	4
PE_4	5	5	5	15	5
PE_5	4	5	5	14	5
PE_6	4	4	4	12	4
PE_7	2	2	3	7	2
Sub – Total	29	30	32	91	30
GRAND TOTAL	91	91	89	271	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	5	5	5	15	5^a
PE_2	5	5	5	15	5^a
PE_3	4	4	4	12	4^b
PE_4	5	5	5	15	5^a
PE_5	5	5	5	15	5^a
PE_6	5	4	4	13	4^b
PE_7	2	2	2	6	2^c
TOTAL	31	30	30	91	
MEAN	4	4	4		4

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	0.13	0.06			
Cropping System (CS)	2	0.13	0.06	0.16^{ns}	6.94	18.00
Error (a)	4	1.59	0.40			
Potato entries (PE)	6	57.94	9.66	2.36**	2.36	3.35
CS x PE	12	1.87	0.16	1.20^{ns}	2.03	2.75
Error (b)	36	3.62	0.10			
TOTAL	62	65.27				

C.V. (A)% = 8.39
C.V. (B)% = 7.37

** - highly significant
ns – not significant

APPENDIX TABLE 5. Plant vigor at 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	4	4	4	12	4
PE_2	4	4	5	13	4
PE_3	5	5	5	15	5
PE_4	5	5	5	15	5
PE_5	5	5	5	15	5
PE_6	5	5	4	14	5
PE_7	0	0	0	0	0
Sub - Total	28	28	28	84	28
CS_1					
PE_1	4	4	4	12	4
PE_2	4	4	4	12	4
PE_3	4	5	4	13	4
PE_4	5	5	5	15	5
PE_5	4	5	5	14	5
PE_6	4	5	4	13	4
PE_7	0	0	0	0	0
Sub - Total	25	28	26	79	26
CS_2					
PE_1	4	4	4	12	4
PE_2	4	4	5	13	4
PE_3	3	5	4	12	4
PE_4	5	5	5	15	5
PE_5	4	4	5	13	4
PE_6	4	4	5	13	4
PE_7	0	0	0	0	0
Sub – Total	24	26	28	78	25
GRAND TOTAL	77	82	82	241	79

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	4	4	4	12	4^b
PE_2	4	4	4	12	4^b
PE_3	5	4	4	13	4^b
PE_4	5	5	5	15	5^a
PE_5	5	5	4	14	5^a
PE_6	5	4	4	13	4^b
PE_7	0	0	0	0	0^c
TOTAL	28	26	25	79	
MEAN	4	4	4		4

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	0.13	0.06			
Cropping System (CS)	2	0.13	0.06	0.16^{ns}	6.94	18.00
Error (a)	4	1.59	0.40			
Potato entries (PE)	6	57.92	9.66	172.79**	2.36	3.35
CS x PE	12	1.87	0.16	0.91^{ns}	2.03	2.75
Error (b)	36	3.62	0.10			
TOTAL	62	65.27				

C.V. (A)% = 10.57
C.V. (B)% = 10.24

** - highly significant
ns – not significant

APPENDIX TABLE 6. Canopy cover at 30 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	27	25	26	78	26
PE_2	45	26	29	100	33
PE_3	3	5	16	24	8
PE_4	38	18	39	95	32
PE_5	25	17	14	56	19
PE_6	23	12	21	56	19
PE_7	2	2	14	18	6
Sub - Total	161	105	159	427	143
CS_1					
PE_1	13	19	23	55	18
PE_2	24	9	17	50	17
PE_3	3	2	3	8	3
PE_4	32	20	20	72	24
PE_5	11	8	6	25	8
PE_6	4	5	6	15	5
PE_7	3	6	4	13	4
Sub - Total	90	69	79	238	79
CS_2					
PE_1	30	22	20	72	24
PE_2	25	20	24	69	23
PE_3	2	0	2	4	1
PE_4	25	12	11	48	16
PE_5	16	9	2	27	9
PE_6	5	8	5	18	6
PE_7	6	5	4	15	5
Sub – Total	109	76	68	253	84
GRAND TOTAL	360	250	306	918	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	26	18	24	68	23^s
PE_2	33	17	23	73	24^a
PE_3	8	3	1	12	4^b
PE_4	32	24	16	72	24^a
PE_5	19	8	9	36	12^b
PE_6	19	5	6	30	10^b
PE_7	6	4	5	15	5^b
TOTAL	143	79	84	306	
MEAN	20	11	12	40	15

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	298.67	149.33			
Cropping System (CS)	2	1051.14	525.57	12.54^{ns}	6.94	18.00
Error (a)	4	167.62	41.91			
Potato entries (PE)	6	4313.21	718.87	27.76**	2.36	3.35
CS x PE	12	464.41	38.70	1.49^{ns}	2.03	2.75
Error (b)	36	932.38	25.90			
TOTAL	62	7227.43				

C.V. (A)% = 35.99
C.V. (B)% = 34.93

** - highly significant
ns – not significant

APPENDIX TABLE 7. Canopy cover at 45 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	45	36	36	117	39
PE_2	55	44	35	134	45
PE_3	18	13	20	51	17
PE_4	54	26	45	125	41
PE_5	48	33	25	106	35
PE_6	36	20	36	92	31
PE_7	10	4	13	27	9
Sub - Total	266	176	210	652	217
CS_1					
PE_1	28	40	35	103	34
PE_2	43	34	28	105	35
PE_3	10	6	9	25	8
PE_4	50	37	35	122	41
PE_5	25	15	15	55	18
PE_6	13	13	10	36	12
PE_7	7	12	6	25	8
Sub - Total	176	157	138	471	156
CS_2					
PE_1	40	43	37	120	40
PE_2	53	35	40	128	43
PE_3	6	6	8	20	7
PE_4	45	25	25	95	32
PE_5	33	20	20	73	24
PE_6	13	14	12	39	13
PE_7	10	10	6	26	9
Sub – Total	200	153	112	501	168
GRAND TOTAL	642	486	460	1624	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	39	34	40	113	38[a]
PE_2	45	35	43	123	41[a]
PE_3	17	8	7	32	11[c]
PE_4	41	41	32	114	38[a]
PE_5	35	18	24	77	26[b]
PE_6	31	12	13	56	19[bc]
PE_7	9	8	9	26	9[c]
TOTAL	217	156	168	541	
MEAN	31	22	24		26

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	726.22	363.11			
Cropping System (CS)	2	896.22	448.11	8.86[ns]	6.94	18.00
Error (a)	4	202.16	50.54			
Potato entries (PE)	6	9825.56	1637.59	47.05**	2.36	3.35
CS x PE	12	789.78	65.82	1.89[ns]	2.03	2.75
Error (b)	36	1252.95	34.80			
TOTAL	62	13692.89				

C.V. (A)% = 25.40
C.V. (B)% = 22.89

** - highly significant
ns – not significant

APPENDIX TABLE 8. Canopy cover at 60 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	57	41	57	155	52
PE_2	68	50	42	160	53
PE_3	30	30	30	90	30
PE_4	65	55	51	171	57
PE_5	55	44	41	140	47
PE_6	57	43	43	143	48
PE_7	16	6	6	28	9
Sub - Total	348	269	270	887	296
CS_1					
PE_1	59	62	71	192	64
PE_2	60	52	60	172	57
PE_3	23	28	20	71	24
PE_4	74	69	65	208	69
PE_5	65	40	40	145	48
PE_6	30	30	33	93	31
PE_7	9	13	17	39	13
Sub - Total	320	294	306	920	306
CS_2					
PE_1	53	45	70	168	56
PE_2	58	76	79	213	71
PE_3	14	16	14	44	15
PE_4	71	55	80	206	69
PE_5	48	51	43	142	47
PE_6	31	49	40	120	40
PE_7	9	12	4	25	8
Sub – Total	284	304	330	918	306
GRAND TOTAL	952	857	906	2725	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	52	64	56	172	57^{ab}
PE_2	53	57	71	181	61^{a}
PE_3	30	24	15	69	23^{d}
PE_4	57	69	69	195	65^{a}
PE_5	47	48	47	142	47^{bc}
PE_6	48	31	40	119	40^{c}
PE_7	9	13	8	30	10^{d}
TOTAL	296	306	306	881	
MEAN	42	44	44		43

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	72.41	86.21			
Cropping System (CS)	2	32.60	16.30	0.11^{ns}	6.94	18.00
Error (a)	4	614.92	153.73			
Potato entries (PE)	6	22580.60	3763.43	70.15**	2.36	3.35
CS x PE	12	1820.06	151.67	2.82^{ns}	2.03	2.75
Error (b)	36	1931.33	53.65			
TOTAL	62	27151.94				

C.V. (A)% = 18.45
C.V. (B)% = 16.83

** - highly significant
ns – not significant

APPENDIX TABLE 9. Canopy cover at 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	32	30	38	100	33
PE_2	30	35	30	95	32
PE_3	20	23	15	58	19
PE_4	41	33	40	114	38
PE_5	37	25	30	92	31
PE_6	40	25	30	95	32
PE_7	0	0	0	0	0
Sub - Total	200	171	183	554	185
CS_1					
PE_1	40	45	55	140	47
PE_2	45	30	39	114	38
PE_3	15	19	13	47	16
PE_4	50	45	40	135	45
PE_5	45	30	30	105	35
PE_6	20	20	20	60	20
PE_7	0	0	0	0	0
Sub - Total	215	189	197	601	201
CS_2					
PE_1	35	23	41	99	33
PE_2	40	55	51	146	48
PE_3	10	10	10	30	10
PE_4	51	43	50	144	48
PE_5	36	40	30	106	35
PE_6	24	30	27	81	27
PE_7	0	0	0	0	0
Sub – Total	196	201	209	606	201
GRAND TOTAL	611	561	589	1761	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	33	47	33	113	38^{ab}
PE_2	32	38	48	118	39^{ab}
PE_3	19	16	10	45	15^{d}
PE_4	38	45	48	131	44^{a}
PE_5	31	35	35	101	34^{bc}
PE_6	32	20	27	79	26^{c}
PE_7	0	0	0	0	0^{e}
TOTAL	185	201	201	587	
MEAN	29	29	29		28

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	59.81	29.91			
Cropping System (CS)	2	78.38	39.19	2.46^{ns}	6.94	18.00
Error (a)	4	63.81	15.95			
Potato entries (PE)	6	13132.08	2787.18	76.27**	2.36	3.35
CS x PE	12	1267.40	105.62	3.68**	2.03	2.75
Error (b)	36	1032.38	28.68			
TOTAL	62	15624.86				

C.V. (A)% = 18.73
C.V. (B)% = 19.16

** - highly significant
ns – not significant

APPENDIX TABLE 10. Initial height of organically grown potato entries intercropped with bush beans and onion leeks (cm)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	19	19	18	56	19
PE_2	15	14	10	39	13
PE_3	4	3	4	11	4
PE_4	20	20	15	55	18
PE_5	12	9	10	31	10
PE_6	7	7	8	22	7
PE_7	5	5	6	16	5
Sub - Total	82	77	65	230	76
CS_2					
PE_1	14	17	21	52	15
PE_2	12	11	13	36	12
PE_3	31	5	3	39	13
PE_4	25	18	24	68	23
PE_5	10	6	8	24	8
PE_6	5	5	4	14	5
PE_7	3	4	3	10	3
Sub - Total	100	66	76	243	79
CS_2					
PE_1	17	18	17	52	17
PE_2	14	13	9	36	12
PE_3	4	4	4	12	4
PE_4	21	20	16	57	19
PE_5	12	9	10	31	10
PE_6	4	4	5	13	4
PE_7	6	3	4	13	4
Sub – Total	78	71	65	214	70
GRAND TOTAL	260	214	206	687	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	19.00	15.00	17.00	51.00	17.78^{ab}
PE_2	13.00	12.00	12.00	37.00	19.89^{a}
PE_3	4.00	13.00	4.00	21.00	12.33^{ab}
PE_4	18.00	23.00	19.00	60.00	6.8^{ab}
PE_5	10.00	8.00	10.00	28.00	9.56^{ab}
PE_6	7.00	5.00	4.00	16.00	5.44^{ab}
PE_7	5.00	3.00	4.00	12.00	4.33^{b}
TOTAL	76.00	79.00	70.00	225.00	
MEAN	12.67	11.52	12.05		10.88

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	3.46	1.73			
Cropping System (CS)	2	13.75	6.87	0.09^{ns}	6.94	18.00
Error (a)	4	370.83	77.71			
Potato entries (PE)	6	1924.16	320.69	5.21**	2.36	3.35
CS x PE	12	77.37	6.45		2.03	2.75
Error (b)	36	2217.05	61.58	0.10^{ns}		
TOTAL	62	4546.60				

C.V. (A)% = 25.81
C.V. (B)% = 24.97

** - highly significant
ns – not significant

APPENDIX TABLE 11. Final height of organically grown potato entries intercropped with bush beans and onion leeks (cm)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	40	45	39	124	41
PE_2	49	44	37	130	43
PE_3	38	39	32	109	36
PE_4	45	52	44	141	47
PE_5	38	40	29	107	36
PE_6	17	18	14	49	16
PE_7	0	0	0	0	0
Sub - Total	227	238	195	660	136
CS_1					
PE_1	51	50	42	143	48
PE_2	43	38	37	118	39
PE_3	33	36	28	97	32
PE_4	54	46	51	151	50
PE_5	40	42	30	112	37
PE_6	15	14	13	42	14
PE_7	0	0	0	0	0
Sub - Total	236	226	201	663	220
CS_2					
PE_1	44	39	46	129	43
PE_2	45	41	39	125	42
PE_3	28	34	32	94	31
PE_4	52	48	44	134	45
PE_5	39	40	33	112	37
PE_6	18	14	14	46	15
PE_7	0	0	0	0	0
Sub – Total	226	216	208	640	213
GRAND TOTAL	689	680	604	1963	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			CROPPING SYSTEM	CROPPING SYSTEM
	CS_0	CS_1	CS_2		
PE_1	41.00	48.00	43.00	132.00	44.00[ab]
PE_2	43.00	39.00	42.00	124.00	41.44[bc]
PE_3	36.00	32.00	31.00	99.00	33.33[d]
PE_4	47.00	50.00	45.00	142.00	48.44[a]
PE_5	36.00	37.00	37.00	110.00	36.78[cd]
PE_6	16.00	14.00	15.00	45.00	15.22[e]
PE_7	0.00	0.00	0.00	0.00	0.00[f]
TOTAL	219.00	220.00	213.00	652.00	
MEAN	31.43	31.57	30.95		31.32

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	207.66	103.83			
Cropping System (CS)	2	4.41	2.21	0.17[ns]	6.94	18.00
Error (a)	4	51.02	12.75			
Potato entries (PE)	6	16474.09	2745.68	297.12**	2.36	3.35
CS x PE	12	157.81	13.15	1.42[ns]	2.03	2.75
Error (b)	36	332.67	9.24			
TOTAL	62	17227.65				

C.V. (A)% = 9.89
C.V. (B)% = 9.71

** - highly significant
ns – not significant

APPENDIX TABLE 12. Leaf miner rating at 30 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	1	1	1	3	1
PE_2	1	1	1	3	1
PE_3	1	1	1	3	1
PE_4	1	1	1	3	1
PE_5	1	1	1	3	1
PE_6	1	1	1	3	1
PE_7	2	2	2	6	2
Sub - Total	8	8	8	24	8
CS_1					
PE_1	1	1	1	3	1
PE_2	1	1	1	3	1
PE_3	1	1	1	3	1
PE_4	2	1	1	3	1
PE_5	1	1	1	3	1
PE_6	1	1	1	3	1
PE_7	1	2	2	6	2
Sub - Total	8	8	8	24	8
CS_2					
PE_1	1	1	1	3	1
PE_2	1	1	1	3	1
PE_3	1	1	1	3	1
PE_4	1	1	1	3	1
PE_5	1	1	1	3	1
PE_6	1	1	1	3	1
PE_7	2	2	2	6	2
Sub – Total	8	8	8	24	8
GRAND TOTAL	24	24	24	72	

APPENDIX TABLE 13. Leaf miner rating at 45 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	1	1	2	4	1
PE_2	2	2	2	6	2
PE_3	1	1	2	4	1
PE_4	1	1	2	4	1
PE_5	1	1	1	3	1
PE_6	1	2	2	5	2
PE_7	2	2	2	6	2
Sub - Total	9	10	13	32	10
CS_1					
PE_1	1	2	2	5	2
PE_2	1	2	2	5	2
PE_3	1	2	1	5	2
PE_4	1	1	1	3	1
PE_5	1	1	1	3	1
PE_6	1	1	2	5	2
PE_7	2	2	2	6	2
Sub - Total	8	11	11	30	12
CS_2					
PE_1	2	2	1	5	2
PE_2	2	2	1	5	2
PE_3	2	2	2	6	2
PE_4	1	1	1	3	1
PE_5	2	2	2	6	2
PE_6	1	1	2	5	2
PE_7	2	2	2	6	2
Sub – Total	12	12	11	35	13
GRAND TOTAL	29	33	35	97	

APPENDIX TABLE 14. Leaf miner rating at 60 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	2	2	2	6	2
PE_2	2	2	2	6	2
PE_3	1	1	2	4	1
PE_4	2	2	2	6	2
PE_5	2	2	2	6	2
PE_6	2	2	2	6	2
PE_7	2	2	2	6	2
Sub - Total	13	13	14	40	13
CS_{114}					
PE_1	1	2	2	5	2
PE_2	2	2	2	6	2
PE_3	1	2	1	5	2
PE_4	2	2	2	6	2
PE_5	2	2	2	6	2
PE_6	1	2	2	5	2
PE_7	2	3	2	8	3
Sub - Total	11	15	13	39	15
CS_2					
PE_1	2	2	2	6	2
PE_2	2	2	2	6	2
PE_3	2	2	2	6	2
PE_4	2	2	2	6	2
PE_5	2	2	2	6	2
PE_6	2	2	2	6	2
PE_7	3	3	2	8	3
Sub – Total	15	15	14	44	15
GRAND TOTAL	39	43	41	123	

APPENDIX TABLE 15. Leaf miner rating at 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_1					
PE_1	3	3	3	9	3
PE_2	3	3	3	9	3
PE_3	1	1	2	4	1
PE_4	2	3	3	8	3
PE_5	3	2	3	8	3
PE_6	2	2	2	6	2
PE_7	5	5	5	15	5
Sub - Total	19	19	19	59	25
CS_1					
PE_1	3	3	3	9	3
PE_2	3	3	3	9	3
PE_3	2	1	1	4	1
PE_4	3	3	3	9	3
PE_5	3	3	2	8	3
PE_6	2	2	2	6	2
PE_7	5	5	5	15	5
Sub - Total	21	20	19	60	15
CS_2					
PE_1	3	3	3	9	3
PE_2	3	3	3	9	3
PE_3	2	2	2	6	2
PE_4	2	2	2	6	2
PE_5	3	3	3	9	3
PE_6	2	2	2	6	2
PE_7	5	5	5	15	5
Sub – Total	20	20	20	60	15
GRAND TOTAL	60	59	58	179	

APPENDIX TABLE 16. Late blight infection at 60 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	1	1	1	3	1
PE_2	2	1	1	4	1
PE_3	2	1	1	4	1
PE_4	2	1	1	4	1
PE_5	2	2	1	4	2
PE_6	2	2	1	5	2
PE_7	2	1	2	5	2
Sub - Total	15	10	8	30	11
CS_1					
PE_1	1	1	1	3	1
PE_2	1	2	1	4	1
PE_3	1	1	2	4	1
PE_4	1	1	1	3	1
PE_5	1	1	1	3	1
PE_6	2	1	1	4	1
PE_7	1	2	2	5	2
Sub - Total	8	9	9	26	8
CS_{21}					
PE_1	1	1	1	3	1
PE_2	3	1	1	5	2
PE_3	1	1	1	3	1
PE_4	1	1	1	3	1
PE_5	1	1	1	3	1
PE_6	1	1	1	3	1
PE_7	3	1	1	5	2
Sub – Total	11	7	7	25	9
GRAND TOTAL	26	26	24	81	

APPENDIX TABLE 17. Late blight infection at 75 DAP of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	1	1	1	3	1
PE_2	1	1	1	3	1
PE_3	1	1	1	3	1
PE_4	1	1	1	3	1
PE_5	1	1	2	4	1
PE_6	1	1	1	3	1
PE_7	4	4	3	11	4
Sub - Total	10	10	10	30	10
CS_{11}					
PE_1	1	1	1	3	1
PE_2	3	1	2	6	3
PE_3	1	1	2	4	1
PE_4	1	1	1	3	1
PE_5	3	1	1	5	2
PE_6	1	1	1	3	1
PE_7	4	4	4	12	4
Sub - Total	14	10	12	36	13
CS_2					
PE_1	1	1	1	3	1
PE_2	2	1	1	3	1
PE_3	1	1	1	3	1
PE_4	2	2	1	5	2
PE_5	1	2	1	5	2
PE_6	2	1	1	4	1
PE_7	4	2	2	8	3
Sub – Total	13	10	8	31	11
GRAND TOTAL	37	30	30	97	

APPENDIX TABLE 18. Haulm weight of organically grown potato entries intercropped with bush beans and onion leeks (g)

TREATMENT		REPLICATION			TOTAL	MEAN
		I	II	III		
CS_0						
	PE_1	40.80	29.80	15.00	85.60	28.50
	PE_2	86.40	83.20	41.10	210.70	70.20
	PE_3	21.90	30.20	35.90	88.00	29.30
	PE_4	100.80	109.10	69.80	297.70	93.20
	PE_5	63.00	57.00	57.30	177.30	59.10
	PE_6	29.70	29.20	22.80	81.70	27.20
	PE_7	3.30	3.20	2.90	9.20	3.10
	Sub - Total	345.90	243.50	244.80	932.20	310.60
CS_1						
	PE_1	56.60	47.30	40.00	143.90	48.00
	PE_2	23.60	30.10	32.00	85.70	28.60
	PE_3	53.60	45.10	29.80	128.30	42.80
	PE_4	30.50	56.20	40.60	127.30	42.40
	PE_5	35.30	56.20	47.00	138.50	46.20
	PE_6	59.00	55.20	51.10	165.30	55.10
	PE_7	3.20	2.00	3.00	8.20	2.70
	Sub - Total	261.80	292.10	243.50	1097.40	223.40
CS_2						
	PE_1	43.40	57.20	147.00	147.40	49.10
	PE_2	50.10	38.00	28.80	116.90	39.00
	PE_3	46.80	41.90	37.80	126.50	42.20
	PE_4	67.80	69.90	90.70	228.40	76.10
	PE_5	41.80	68.80	49.60	130.20	53.40
	PE_6	38.50	27.40	30.90	86.80	29.30
	PE_7	2.30	3.70	3.10	9.10	3.00
	Sub – Total	290.70	306.90	287.70	875.30	292.10
GRAND TOTAL		898.40	942.50	776.00	2904.90	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	28.50	48.00	49.10	125.60	41.88[b]
PE_2	70.20	28.60	39.00	137.80	45.92[b]
PE_3	29.30	42.80	42.20	114.30	38.11[b]
PE_4	93.20	42.40	76.10	211.70	70.60[a]
PE_5	59.10	46.20	53.40	158.70	52.89[b]
PE_6	27.20	55.10	29.30	111.60	38.20[b]
PE_7	3.10	2.70	3.00	8.80	3.08[c]
TOTAL	310.60	223.40	292.10	868.50	
MEAN	44.40	37.97	42.21		41.53

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	699.34	349.68			
Cropping System (CS)	2	448.47	224.23	2.05[ns]	6.94	18.00
Error (a)	4	436.79	109.20			
Potato entries (PE)	6	22453.67	3742.28	36.55**	2.36	3.35
CS x PE	12	91681.86	759.07	7.41**	2.03	2.75
Error (b)	36	3685.57	102.38			
TOTAL	62	36833.72				

C.V. (A)% = 24.45
C.V. (B)% = 24.37

** - highly significant
ns – not significant

APPENDIX TABLE 19. Percent hills harvested of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	100	100	100	300	100
PE_2	100	100	100	300	100
PE_3	37	77	67	181	60
PE_4	100	100	100	300	100
PE_5	100	100	100	300	100
PE_6	100	100	100	300	100
PE_7	43	33	57	126	26
Sub - Total	58	610	617	1807	576
CS_1					
PE_1	100	100	100	300	100
PE_2	100	100	100	300	100
PE_3	81	56	25	162	54
PE_4	100	94	100	294	98
PE_5	100	100	100	300	100
PE_6	100	94	94	288	96
PE_7	94	81	75	250	83
Sub - Total	575	625	594	1894	631
CS_2					
PE_1	100	100	100	300	100
PE_2	94	100	100	294	98
PE_3	38	75	31	144	48
PE_4	100	100	100	300	100
PE_5	100	100	82	281	93
PE_6	100	100	100	300	100
PE_7	81	100	62	243	81
Sub – Total	607	675	580	1862	620
GRAND TOTAL	1762	1910	1791	5563	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	100	100	100	300	100[a]
PE_2	100	100	98	298	99[a]
PE_3	60	54	48	162	54[b]
PE_4	100	98	100	298	99[a]
PE_5	100	100	93	293	98[a]
PE_6	100	96	100	296	99[a]
PE_7	26	83	81	190	69[b]
TOTAL	586	631	620	1837	
MEAN	84	90	89		74

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	341.63	170.68			
Cropping System (CS)	2	184.41	92.21	0.39[ns]	6.94	18.00
Error (a)	4	930.92	232.73			
Potato entries (PE)	6	19167.94	3194.66	32.86**	2.36	3.35
CS x PE	12	3406.92	283.91	2.92**	2.03	2.75
Error (b)	36	3499.71	97.21			
TOTAL	62	27531.27				

C.V. (A)% = 11.92
C.V. (B)% = 11.17

** - highly significant
ns – not significant

APPENDIX TABLE 20. Number of marketable extra large tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	8	3	19	30	10
PE_2	7	5	9	21	7
PE_3	2	6	5	13	4
PE_4	7	6	9	22	7
PE_5	2	4	5	11	4
PE_6	4	4	9	17	6
PE_7	0	0	0	0	0
Sub - Total	30	28	56	114	38
CS_1					
PE_1	13	4	11	28	9
PE_2	11	7	5	23	8
PE_3	1	8	0	9	3
PE_4	7	7	4	18	6
PE_5	1	3	0	4	1
PE_6	8	6	0	14	5
PE_7	0	0	0	0	0
Sub - Total	41	35	20	96	32
CS_2					
PE_1	3	10	6	19	6
PE_2	9	7	7	23	8
PE_3	0	2	1	3	1
PE_4	12	8	9	29	10
PE_5	4	6	6	16	5
PE_6	2	6	7	15	5
PE_7	0	0	0	0	0
Sub – Total	30	39	36	105	35
GRAND TOTAL	101	102	113	315	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	10	9	6	25	9^{a}
PE_2	7	8	8	23	7^{ab}
PE_3	4	3	1	8	3^{bc}
PE_4	7	6	10	23	8^{a}
PE_5	4	1	5	10	3^{bc}
PE_6	6	5	5	16	5^{ab}
PE_7	0	0	0	0	0^{c}
TOTAL	38	32	35	105	
MEAN	5	5	5		5

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	3.52	1.76			
Cropping System (CS)	2	7.71	3.86	0.15^{ns}	6.94	18.00
Error (a)	4	105.62	26.41			
Potato entries (PE)	6	522.89	87.15	11.67**	2.36	3.35
CS x PE	12	79.40	6.62	0.89^{ns}	2.03	2.75
Error (b)	36	268.86	7.47			
TOTAL	62	988.00				

C.V. (A)% = 21.19
C.V. (B)% = 24.66

** - highly significant
ns – not significant

APPENDIX TABLE 21. Number of marketable large tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	38	46	13	97	32
PE_2	9	21	11	41	14
PE_3	7	17	11	34	11
PE_4	14	18	9	41	14
PE_5	9	10	15	34	11
PE_6	11	15	10	36	12
PE_7	0	0	0	0	0
Sub - Total	88	127	69	283	94
CS_1					
PE_1	27	30	13	70	23
PE_2	19	11	12	42	14
PE_3	7	7	1	15	5
PE_4	13	17	10	40	13
PE_5	8	14	6	28	9
PE_6	7	13	1	21	7
PE_7	0	0	0	0	0
Sub - Total	81	92	43	216	71
CS_2					
PE_1	7	13	5	25	8
PE_2	14	23	6	43	14
PE_3	0	5	9	14	5
PE_4	17	15	4	36	12
PE_5	7	9	12	28	9
PE_6	6	9	9	24	8
PE_7	0	0	0	0	0
Sub – Total	51	74	45	110	56
GRAND TOTAL	220	293	157	669	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	32	23	23	78	21^{a}
PE_2	14	14	14	42	14^{ab}
PE_3	11	5	5	21	7^{bc}
PE_4	14	13	12	39	13^{ab}
PE_5	11	9	9	29	10^{b}
PE_6	12	7	8	27	9^{bc}
PE_7	0	0	0	0	0^{c}
TOTAL	94	71	56	236	
MEAN	14	10	8		11

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	441.18	220.59			
Cropping System (CS)	2	313.27	156.63	9.97*	6.94	18.00
Error (a)	4	64.44	16.11			
Potato entries (PE)	6	2339.71	389.95	14.17**	2.36	3.35
CS x PE	12	717.62	59.80	2.17*	2.03	2.75
Error (b)	36	990.38	27.51			
TOTAL	62	4866.60				

C.V. (A)% = 48.29
C.V. (B)% = 49.32

* - highly significant
ns – not significant

APPENDIX TABLE 22. Number of marketable medium tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT		REPLICATION			TOTAL	MEAN
		I	II	III		
CS_0						
	PE_1	24	48	52	124	41
	PE_2	21	43	24	88	29
	PE_3	50	15	10	75	25
	PE_4	17	50	23	90	30
	PE_5	26	41	17	84	28
	PE_6	22	14	14	50	17
	PE_7	0	0	0	0	0
	Sub - Total	160	211	140	511	170
CS_1						
	PE_1	15	26	14	55	18
	PE_2	24	11	8	43	14
	PE_3	5	3	3	11	4
	PE_4	17	12	13	42	14
	PE_5	5	3	3	11	4
	PE_6	18	6	6	30	10
	PE_7	0	0	0	0	0
	Sub - Total	84	61	47	192	64
CS_2						
	PE_1	20	17	28	65	22
	PE_2	18	27	15	60	20
	PE_3	2	4	12	18	6
	PE_4	18	13	8	39	13
	PE_5	9	18	6	33	11
	PE_6	9	13	11	33	11
	PE_7	2	2	0	4	1
	Sub – Total	78	94	80	252	84
GRAND TOTAL		322	366	267	955	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	41	18	22	81	27^{a}
PE_2	29	14	20	63	21^{a}
PE_3	25	4	6	35	12^{ab}
PE_4	30	14	13	57	19^{a}
PE_5	28	4	11	43	14^{ab}
PE_6	17	10	11	38	13^{ab}
PE_7	0	0	1	1	0^{b}
TOTAL	170	64	84	318	
MEAN	24^{A}	9^{B}	12^{B}		15

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	234.32	117.16			
Cropping System (CS)	2	2737.17	7368.59	20.27**	6.94	18.00
Error (a)	4	270.06	67.52			
Potato entries (PE)	6	3883.75	647.29	8.24**	2.36	3.35
CS x PE	12	917.49	76.46	0.97^{ns}	2.03	2.75
Error (b)	36	2829.62	78.60			
TOTAL	62	10872.41				

C.V. (A)% = 44.17
C.V. (B)% = 27.49

** - highly significant
ns – not significant

APPENDIX TABLE 23. Number of marketable small tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	20	30	29	79	26
PE_2	43	26	13	52	17
PE_3	10	9	5	24	8
PE_4	14	12	14	43	14
PE_5	10	13	9	32	11
PE_6	12	15	16	43	14
PE_7	5	7	4	16	5
Sub - Total	84	112	90	289	95
CS_1					
PE_1	25	43	13	81	27
PE_2	44	30	24	98	33
PE_3	10	11	13	34	11
PE_4	43	19	11	73	24
PE_5	39	42	33	11	38
PE_6	45	34	10	89	30
PE_7	3	5	2	10	3
Sub - Total	209	184	106	396	166
CS_2					
PE_1	32	9	11	52	17
PE_2	12	17	8	37	12
PE_3	6	12	0	18	6
PE_4	29	24	12	65	22
PE_5	14	9	9	32	11
PE_6	19	6	7	32	11
PE_7	6	13	4	22	7
Sub – Total	118	90	51	258	86
GRAND TOTAL	411	386	247	943	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	26	27	17	70	24[a]
PE_2	17	33	12	62	21[a]
PE_3	8	11	6	25	8[bc]
PE_4	14	24	22	60	20[ab]
PE_5	11	38	11	60	20[ab]
PE_6	14	30	11	55	18[ab]
PE_7	5	3	7	15	5[c]
TOTAL	95	166	86	347	
MEAN	14	23	12		17

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	743.52	371.76			
Cropping System (CS)	2	1646.00	823.00	7.05*	6.94	18.00
Error (a)	4	466.76	116.69			
Potato entries (PE)	6	2516.54	419.42	9.04**	2.36	3.35
CS x PE	12	1575.56	131.30	2.3**	2.03	2.75
Error (b)	36	1671.05	46.42			
TOTAL	62	8619.43				

C.V. (A)% = 41.75
C.V. (B)% = 41.11

** - highly significant
ns – not significant

APPENDIX TABLE 24. Number of marketable marble tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	18	0	60	78	26
PE_2	30	12	14	56	19
PE_3	0	8	12	50	7
PE_4	15	15	38	68	23
PE_5	10	9	16	35	12
PE_6	10	28	8	46	15
PE_7	3	4	6	13	4
Sub - Total	86	76	154	316	106
CS_1					
PE_1	14	0	16	30	10
PE_2	0	9	5	14	5
PE_3	0	0	0	0	0
PE_4	8	10	6	24	8
PE_5	12	13	16	41	14
PE_6	10	4	10	24	8
PE_7	7	9	11	27	9
Sub - Total	111	45	64	160	55
CS_2					
PE_1	9	12	11	32	11
PE_2	0	0	10	10	3
PE_3	0	7	2	9	3
PE_4	0	10	10	20	7
PE_5	0	14	9	23	8
PE_6	0	5	8	13	4
PE_7	0	0	8	8	3
Sub – Total	9	48	58	115	39
GRAND TOTAL	206	169	276	591	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	26	10	11	47	16
PE_2	19	5	3	27	9
PE_3	7	0	3	10	3
PE_4	23	8	7	38	12
PE_5	12	14	8	34	11
PE_6	15	8	4	27	9
PE_7	4	9	3	16	5
TOTAL	106	55	39	199	
MEAN	15	8	5		9

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	466.67	233.33			
Cropping System (CS)	2	1026.00	573.00	7.02^{*}	6.94	18.00
Error (a)	4	292.48	73.12			
Potato entries (PE)	6	924.89	154.15	2.08^{ns}	2.36	3.35
CS x PE	12	687.78	57.31	0.78^{ns}	2.03	2.75
Error (b)	36	2668.19	74.12			
TOTAL	62	6066.00				

C.V. (A)% = 28.18
C.V. (B)% = 22.24

ns – not significant

APPENDIX TABLE 25. Number of non-marketable tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	71	21	30	58	19
PE_2	50	22	20	92	31
PE_3	16	19	19	54	18
PE_4	11	23	17	51	17
PE_5	5	32	30	67	22
PE_6	29	21	14	64	21
PE_7	13	9	10	32	11
Sub - Total	131	147	140	418	139
CS_1					
PE_1	20	21	13	54	18
PE_2	17	15	21	53	18
PE_3	16	27	15	58	19
PE_4	12	12	5	29	10
PE_5	10	21	13	44	15
PE_6	18	21	6	45	15
PE_7	13	9	10	32	11
Sub - Total	106	126	833	315	106
CS_2					
PE_1	25	18	10	53	18
PE_2	15	31	6	42	14
PE_3	18	19	13	50	17
PE_4	4	17	10	31	10
PE_5	9	10	7	26	9
PE_6	9	19	5	33	11
PE_7	14	20	6	40	13
Sub – Total	94	134	57	275	92
GRAND TOTAL	331	407	580	1008	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	19	18	18	55	18
PE_2	31	18	14	63	28
PE_3	18	19	17	54	18
PE_4	17	10	10	37	18
PE_5	22	15	9	46	15
PE_6	21	15	11	47	21
PE_7	11	11	13	35	12
TOTAL	139	106	92	337	
MEAN	20	17	19		19

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	267.56	133.78			
Cropping System (CS)	2	72.03	36.02	1.07^{ns}	6.94	18.00
Error (a)	4	134.54	33.64			
Potato entries (PE)	6	1400.38	246.73	1.73^{ns}	2.36	3.35
CS x PE	12	1370.19	114.18	0.80^{ns}	2.03	2.75
Error (b)	36	5134.57	142.64			
TOTAL	62	84.27				

C.V. (A)% = 41.75
C.V. (B)% = 34.25

** - not significant

APPENDIX TABLE 26. Weight of marketable extra large tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks (kg)

TREATMENT		REPLICATION			TOTAL	MEAN
		I	II	III		
CS_0						
	PE_1	0.55	0.35	1.05	1.95	0.65
	PE_2	0.75	0.50	0.69	1.94	0.65
	PE_3	0.15	0.55	0.30	1.00	0.33
	PE_4	0.85	0.85	0.78	2.48	0.83
	PE_5	0.20	0.35	0.40	0.95	0.32
	PE_6	0.30	0.40	0.72	1.42	0.47
	PE_7	0.00	0.00	0.00	0.00	0.00
	Sub - Total	2.80	3.00	4.39	10.19	3.25
CS_1						
	PE_1	0.85	0.55	0.90	2.30	0.77
	PE_2	1.30	0.75	0.25	2.30	0.77
	PE_3	0.10	0.40	0.00	0.50	0.17
	PE_4	1.15	0.10	0.50	1.75	0.58
	PE_5	0.20	0.40	0.00	0.60	0.20
	PE_6	0.90	0.60	0.00	1.50	0.50
	PE_7	0.00	0.00	0.00	0.00	0.00
	Sub - Total	4.50	2.78	1.65	8.95	2.99
CS_2						
	PE_1	0.25	0.75	0.60	1.60	0.53
	PE_2	0.90	0.65	0.90	2.45	0.82
	PE_3	0.00	0.20	0.07	0.27	0.09
	PE_4	1.10	0.80	1.10	3.00	1.00
	PE_5	0.40	0.70	0.68	1.78	0.59
	PE_6	0.42	0.45	0.60	1.47	0.59
	PE_7	0.00	0.00	0.00	0.00	0.00
	Sub – Total	3.07	3.55	4.58	10.57	3.62
GRAND TOTAL		11.00	9.33	10.62	29.71	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	0.65	0.77	0.52	1.95	0.65^{ab}
PE_2	0.65	0.77	0.82	2.24	0.74^{ab}
PE_3	0.33	0.17	0.09	1.40	0.20^{ad}
PE_4	0.83	0.58	1.00	2.40	0.80^{a}
PE_5	0.32	0.20	0.59	1.11	0.37^{bcd}
PE_6	0.47	0.50	0.59	1.56	0.48^{abc}
PE_7	0.00	0.00	0.00	0.00	0^{d}
TOTAL	3.25	2.99	3.62	10.66	
MEAN	0.46	0.43	0.50		0.46

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	0.03	0.01			
Cropping System (CS)	2	0.06	0.03	0.17^{ns}	6.94	18.00
Error (a)	4	0.72	0.18			
Potato entries (PE)	6	4.71	0.79	15.30**	2.36	3.35
CS x PE	12	0. 67	0.06	1.08^{ns}	2.03	2.75
Error (b)	36	1.85	0.05			
TOTAL	62	8.04				

C.V. (A)% = 24.57
C.V. (B)% = 28.79

** - highly significant
ns – not significant

APPENDIX TABLE 27. Weight of marketable large tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks (kg)

TREATMENT		REPLICATION			TOTAL	MEAN
		I	II	III		
CS_0						
	PE_1	1.90	2.05	0.60	4.55	1.52
	PE_2	0.65	1.40	0.48	2.53	0.84
	PE_3	0.35	0.90	0.51	1.76	0.59
	PE_4	1.00	1.50	0.64	3.14	1.05
	PE_5	0.35	0.65	0.90	1.90	0.63
	PE_6	0.75	0.85	0.47	2.07	0.69
	PE_7	0.00	0.00	0.00	0.00	0.00
	Sub - Total	5.00	7.80	3.60	16.40	4.32
CS_1						
	PE_1	1.25	1.80	0.60	3.63	1.22
	PE_2	1.25	0.95	0.85	3.05	1.02
	PE_3	0.45	0.20	0.07	0.72	0.24
	PE_4	1.10	1.15	0.80	3.05	1.02
	PE_5	0.65	1.00	0.40	2.05	0.68
	PE_6	0.50	0.70	0.10	1.30	0.43
	PE_7	0.00	0.00	0.00	0.00	0.00
	Sub - Total	5.20	5.80	3.45	15.17	4.97
CS_2						
	PE_1	0.45	0.75	0.31	1.51	0.50
	PE_2	0.80	1.50	0.20	2.50	0.83
	PE_3	0.00	0.25	0.31	0.56	0.19
	PE_4	1.00	1.05	0.45	2.50	0.83
	PE_5	0.40	0.55	0.74	1.69	0.56
	PE_6	0.30	0.50	0.36	1.16	0.39
	PE_7	0.00	0.00	0.00	0.00	0.00
	Sub – Total	2.95	5.05	2.37	9.92	3.30
GRAND TOTAL		13.15	19.10	9.42	41.49	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS1	CS_2		
PE_1	1.52	1.22	0.50	3.24	1.08^{d}
PE_2	0.84	1.02	0.83	2.69	0.90^{ab}
PE_3	0.59	0.24	0.19	1.02	0.34^{cd}
PE_4	1.05	1.o2	0.83	2.9	0.97ab
PE_5	0.63	0.68	0.56	1.87	0.63^{abc}
PE_6	0.69	0.43	0.39	1.51	0.50^{bc}
PE_7	0.00	0.00	0.00	0.00	0^{d}
TOTAL	4.32	4.97	3.30	13.23	
MEAN	0.76	0.66	0.47		0.60

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	1.91	0.95			
Cropping System (CS)	2	0.89	0.44	8.54^{*}	6.94	18.00
Error (a)	4	0.21	0.05			
Potato entries (PE)	6	7.96	1.33	15.87**	2.36	3.35
CS x PE	12	1.35	0.11	1.34^{ns}	2.03	2.75
Error (b)	36	3.01	0.08			
TOTAL	62	15.32				

C.V. (A)% = 45.01
C.V. (B)% = 45.89

** - highly significant
ns – not significant

APPENDIX TABLE 28. Weight of marketable medium tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks (kg)

TREATMENT		REPLICATION			TOTAL	MEAN
		I	II	III		
CS_0						
	PE_1	0.75	1.30	1.60	3.65	1.22
	PE_2	1.20	1.80	0.88	3.88	1.29
	PE_3	0.10	0.50	0.28	0.88	0.29
	PE_4	0.95	2.25	0.96	4.16	1.39
	PE_5	0.15	1.90	0.75	3.80	1.27
	PE_6	1.05	0.55	0.24	1.84	0.61
	PE_7	0.00	0.00	0.00	0.00	0.00
	Sub - Total	4.65	8.30	4.71	18.06	6.07
CS_1						
	PE_1	0.45	0.90	0.45	1.80	0.60
	PE_2	0.85	0.75	0.35	1.95	0.65
	PE_3	0.20	0.10	0.10	0.40	0.13
	PE_4	0.90	0.60	0.73	2.23	0.74
	PE_5	0.90	0.90	0.95	2.75	0.92
	PE_6	0.70	0.15	0.30	1.15	0.38
	PE_7	0.00	0.00	0.00	0.00	0.00
	Sub - Total	4.00	3.40	2.88	10.28	3.42
CS_2						
	PE_1	0.75	0.55	1.16	2.46	0.82
	PE_2	0.70	0.95	0.70	2.35	0.78
	PE_3	0.10	0.15	0.24	0.49	0.16
	PE_4	0.70	0.70	0.25	1.65	0.55
	PE_5	0.30	0.75	0.30	135	0.45
	PE_6	0.30	0.45	0.30	1.05	0.35
	PE_7	0.05	0.06	0.00	0.11	0.04
	Sub – Total	3.35	4.15	2.95	8.91	3.15
GRAND TOTAL		12.00	15.85	10.59	37.79	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	1.22	0.60	0.82	2.64	0.88[a]
PE_2	1.29	0.65	0.78	2.72	0.91[a]
PE_3	0.29	0.13	0.16	0.58	0.20[b]
PE_4	1.39	0.74	0.55	2.68	0.90[a]
PE_5	1.27	0.92	0.45	2.64	0.77[a]
PE_6	0.61	0.38	0.35	1.34	0.45[ab]
PE_7	0.00	0.00	0.04	0.04	0.10[b]
TOTAL	6.07	3.42	3.15	12.64	
MEAN	0.82	0.49	0.45		0.60

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	0.65	0.32			
Cropping System (CS)	2	1.73	0.86	5.04[ns]	6.94	18.00
Error (a)	4	0.91	0.23			
Accessions (A)	6	7.35	1.23	4.38**	2.36	3.35
Potato entries (PE)	12	1.32	0.11	1.44[ns]	2.03	2.75
CS x PE	36	3.38	0.09			
TOTAL	62	15.35				

C.V. (A)% = 25.80
C.V. (B)% = 22.34

** - highly significant
ns – not significant

APPENDIX TABLE 29. Weight of marketable small tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks (kg)

TREATMENT		REPLICATION			TOTAL	MEAN
		I	II	III		
CS_0						
	PE_1	0.05	0.65	0.55	1.25	0.42
	PE_2	1.80	0.70	0.62	3.12	1.04
	PE_3	0.15	0.20	0.26	0.61	0.20
	PE_4	1.60	0.40	0.37	2.37	0.79
	PE_5	1.00	0.30	0.80	2.10	0.70
	PE_6	1.20	0.80	0.10	2.10	0.70
	PE_7	0.05	0.05	0.03	0.13	0.04
	Sub - Total	5.85	3.10	2.73	11.68	389.00
CS_1						
	PE_1	0.30	0.50	0.60	1.40	0.47
	PE_2	0.20	0.15	0.25	0.60	0.40
	PE_3	0.15	0.15	0.12	0.42	0.14
	PE_4	0.35	0.30	0.45	1.10	0.37
	PE_5	0.35	0.35	0.20	0.90	0.30
	PE_6	0.20	0.15	0.25	0.60	0.40
	PE_7	0.05	0.06	0.03	0.14	0.05
	Sub - Total	1.60	1.66	1.90	5.16	1.66
CS_2						
	PE_1	0.76	0.20	0.28	1.24	0.41
	PE_2	0.30	0.30	0.20	0.80	0.27
	PE_3	0.10	0.30	0.00	0.40	0.13
	PE_4	0.60	0.70	0.20	1.50	0.50
	PE_5	0.30	0.20	0.20	0.70	0.23
	PE_6	0.40	0.10	0.12	0.62	0.21
	PE_7	0.05	0.10	0.03	0.18	0.06
	Sub – Total	2.51	1.90	1.03	5.44	1.81
GRAND TOTAL		9.96	6.66	5.66	22.28	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	0.42	0.47	0.41	1.30	0.43[ab]
PE_2	1.04	0.40	0.27	1.71	0.50[ab]
PE_3	0.20	0.14	0.13	0.47	0.16[ab]
PE_4	0.79	0.37	0.50	1.66	0.55[a]
PE_5	0.70	0.30	0.23	0.33	0.41[ab]
PE_6	0.70	0.40	0.21	0.32	0.37[ab]
PE_7	0.04	0.05	0.06	0.15	0.05[b]
TOTAL	3.89	1.66	1.81	7.36	
MEAN	0.56	0.25	0.26		0.35

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	0.48	0.24			
Cropping System (CS)	2	1.29	0.65	4.55[ns]	6.94	18.00
Error (a)	4	0.51	0.13			
Potato entries (PE)	6	1.81	0.30	1.55[ns]	2.36	3.35
CS x PE	12	2.19	0.10	0.25[ns]	2.03	2.75
Error (b)	36	2.48	0.07			
TOTAL	62	7.77				

C.V. (A)% = 27.33
C.V. (B)% = 24.19

** - not significant

APPENDIX TABLE 30. Weight of marketable marble-sized tubers per plot of organically grown potato entries intercropped with bush beans and onion leeks (kg)

TREATMENT		REPLICATION			TOTAL	MEAN
		I	II	III		
CS_0						
	PE_1	0.00	0.00	0.91	1.06	0.35
	PE_2	0.50	0.10	0.20	0.80	0.27
	PE_3	0.00	0.07	0.15	0.22	0.07
	PE_4	0.25	0.15	0.80	1.20	0.40
	PE_5	0.10	0.10	0.10	0.30	0.10
	PE_6	0.15	0.30	0.04	0.49	0.16
	PE_7	0.02	0.04	0.03	0.09	0.03
	Sub - Total	1.02	0.76	2.23	4.16	1.38
CS_1						
	PE_1	0.00	0.10	0.20	0.30	0.10
	PE_2	0.10	0.00	0.10	0.20	0.07
	PE_3	0.00	0.00	0.00	0.00	0.00
	PE_4	0.15	0.10	0.10	0.35	0.12
	PE_5	0.15	0.10	0.20	0.45	0.15
	PE_6	0.05	0.10	0.05	0.20	0.07
	PE_7	0.00	0.05	0.08	0.13	0.04
	Sub - Total	0.45	0.45	0.73	1.63	0.55
CS_2						
	PE_1	0.08	0.15	0.11	0.34	0.11
	PE_2	0.00	0.00	0.15	0.15	0.05
	PE_3	0.00	0.15	0.02	0.17	0.06
	PE_4	0.00	0.12	0.10	0.22	0.01
	PE_5	0.00	0.10	0.07	0.17	0.06
	PE_6	0.00	0.05	0.07	0.12	0.04
	PE_7	0.00	0.00	0.03	0.03	0.01
	Sub – Total	0.08	0.57	0.55	1.20	0.34
GRAND TOTAL		1.47	1.78	3.51	6.98	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	0.35	0.10	0.11	0.56	0.17
PE_2	0.27	0.07	0.05	0.39	0.13
PE_3	0.07	0.00	0.06	0.13	0.04
PE_4	0.40	0.12	0.01	0.33	0.28
PE_5	0.10	0.15	0.06	0.31	0.10
PE_6	0.16	0.07	0.04	0.27	0.09
PE_7	0.03	0.01	0.01	0.08	0.03
TOTAL	1.38	0.34	0.34	2.27	
MEAN	0.19	0.08	0.06		0.12

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	0.11	0.06			
Cropping System (CS)	2	0.22	0.11	4.55^{ns}	6.94	18.00
Error (a)	4	0.10	0.02			
Potato entries (PE)	6	0.21	0.03	1.55^{ns}	2.36	3.35
CS x PE	12	0.19	0.01	00.68^{ns}	2.03	2.75
Error (b)	36	0.81	0.02			
TOTAL	62	1.63				

C.V. (A)% = 38.69
C.V. (B)% = 28.23

** - highly significant
ns – not significant

APPENDIX TABLE 31. Weight of non-marketable tubers per plot of organically grown potato entries intercropped with bush beans and onion leek (kg)

TREATMENT		REPLICATION			TOTAL	MEAN
		I	II	III		
CS_0						
	PE_1	0.05	0.10	0.13	0.28	0.09
	PE_2	0.20	0.05	0.11	0.36	0.12
	PE_3	0.25	0.05	0.07	0.37	0.12
	PE_4	0.05	0.05	0.06	0.16	0.05
	PE_5	0.02	0.10	0.10	0.22	0.07
	PE_6	0.15	0.04	0.05	0.24	0.08
	PE_7	0.03	0.02	0.03	0.08	0.03
	Sub - Total	1.80	2.30	2.44	2.43	0.56
CS_1						
	PE_1	0.35	0.05	0.05	0.45	0.15
	PE_2	0.07	0.10	0.13	0.30	0.10
	PE_3	0.07	0.20	0.10	0.37	0.12
	PE_4	0.02	0.05	0.04	0.11	0.04
	PE_5	0.05	0.05	0.02	0.12	0.04
	PE_6	0.05	0.05	0.01	0.11	0.04
	PE_7	0.03	0.02	0.01	0.07	0.02
	Sub - Total	3.25	2.50	1.45	1.53	0.43
CS_2						
	PE_1	0.20	0.07	0.03	0.30	0.10
	PE_2	0.15	0.10	0.05	0.30	0.10
	PE_3	0.20	0.05	0.08	0.33	0.11
	PE_4	0.03	0.08	0.02	0.13	0.04
	PE_5	0.06	0.03	0.02	0.13	0.04
	PE_6	0.02	0.10	0.01	0.13	0.04
	PE_7	0.05	0.05	0.01	0.11	0.04
	Sub – Total	0.72	0.43	0.22	1.42	0.47
GRAND TOTAL		5.77	5.23	4.105	5.37	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	0.09	0.15	0.10	0.34	0.11
PE_2	0.12	0.10	0.10	0.34	0.11
PE_3	0.12	0.12	0.11	0.353	0.12
PE_4	0.07	0.04	0.04	0.129	0.04
PE_5	0.08	0.04	0.01	0.122	0.05
PE_6	0.08	0.04	0.04	0.159	0.05
PE_7	0.03	0.02	0.04	0.087	0.02
TOTAL	5.63	0.43	0.34	6.53	
MEAN	0.08	0.07	0.07		0.07

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	0.02	0.01			
Cropping System (CS)	2	0.00	0.00	0.60^{ns}	19.25	99.25
Error (a)	4	0.01	0.00			
Potato entries (PE)	6	0.08	0.01	2.30^{ns}	6.94	18.00
CS x PE	12	0.01	0.00	0.25^{ns}	2.03	2.75
Error (b)	36	0.14	0.00			
TOTAL	62	0.26				

C.V. (A)% = 20.94
C.V. (B)% = 23.12

** - highly significant
ns – not significant

APPENDIX TABLE 32. Total yield per plot of organically grown potato entries intercropped with bush beans and onion leeks (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	3.45	4.45	4.84	12.38	4.13
PE_2	5.15	4.55	2.94	12.64	4.21
PE_3	0.80	2.27	1.56	4.63	1.54
PE_4	4.85	5.20	3.66	13.71	4.57
PE_5	2.47	3.40	2.15	8.02	2.67
PE_6	3.60	2.19	1.62	7.41	2.47
PE_7	0.10	0.11	0.09	0.20	0.07
Sub - Total	20.42	22.17	16.86	59.05	19.67
CS_1					
PE_1	3.20	3.90	2.80	9.90	3.30
PE_2	3.82	3.40	2.00	9.22	3.07
PE_3	0.92	0.90	0.33	2.15	0.72
PE_4	3.67	2.25	2.81	8.73	2.90
PE_5	2.30	2.80	1.77	6.87	2.29
PE_6	2.40	1.75	0.71	4.86	1.62
PE_7	0.08	0.13	0.13	0.23	0.11
Sub - Total	15.56	15.13	10.55	42.07	11.72
CS_2					
PE_1	2.49	2.47	2.49	7.45	2.50
PE_2	2.90	3.45	2.15	8.50	2.80
PE_3	0.23	1.13	0.66	2.02	0.67
PE_4	3.55	3.47	2.15	9.17	3.10
PE_5	1.48	2.33	2.01	5.81	1.90
PE_6	1.42	1.65	1.46	4.53	1.51
PE_7	0.10	0.15	0.07	0.32	0.11
Sub – Total	12.16	14.65	10.95	37.78	12.59
GRAND TOTAL	48.14	51.95	38.36	129.89	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	4.13	3.30	2.50	9.93	3.30^{a}
PE_2	1.21	3.07	2.80	7.08	3.37^{a}
PE_3	1.54	0.72	0.67	3.0	0.97^{cd}
PE_4	4.57	2.90	3.10	10.57	3.51^{a}
PE_5	2.67	2.29	1.90	6.86	2.30^{ab}
PE_6	2.47	1.62	1.51	5.6	1.87^{bc}
PE_7	0.07	0.11	0.11	0.287	0.10^{d}
TOTAL	19.66	11.72	12.59	43.97	
MEAN	2.81^{a}	2.00^{ab}	1.80^{b}		2.20

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	5.49	2.75			
Cropping System (CS)	2	20.84	10.42	8.06^{*}	6.94	18.00
Error (a)	4	5.17	1.29			
Potato entries (PE)	6	74.67	12.44	21.45**	2.36	3.35
CS x PE	12	5.10	0.42	0.73^{ns}	2.03	2.75
Error (b)	36	20.88	0.58			
TOTAL	62	132.15				

C.V. (A)% = 36.19
C.V. (B)% = 34.15

** - highly significant
ns – not significant

APPENDIX TABLE 33. Computed yield of organically grown potato entries intercropped with bush beans and onion leeks (tons/ha)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_0					
PE_1	6.90	8.90	8.96	24.76	8.25
PE_2	10.30	9.10	5.88	25.28	8.43
PE_3	1.60	4.54	3.12	9.26	3.09
PE_4	9.70	10.40	7.32	27.42	9.14
PE_5	4.94	6.80	4.30	16.04	5.35
PE_6	7.20	4.38	3.24	14.82	4.94
PE_7	0.20	6.22	0.18	0.60	0.20
Sub - Total	40.84	44.34	32.92	118.80	39.40
CS1					
PE_1	6.40	7.80	5.60	19.80	6.60
PE_2	7.64	6.80	4.00	18.44	5.82
PE_3	1.84	1.80	0.66	4.30	1.43
PE_4	7.34	4.50	5.62	17.46	5.82
PE_5	4.60	5.60	3.54	13.74	4.58
PE_6	4.80	3.50	1.42	9.72	3.24
PE_7	0.16	0.26	0.25	0.67	0.22
Sub - Total	32.78	30.26	21.09	33.51	27.71
CS_2					
PE_1	4.98	4.94	4.98	14.90	4.97
PE_2	5.80	6.90	4.30	17.00	5.70
PE_3	0.45	2.26	1.32	4.03	1.34
PE_4	7.10	6.94	4.30	18.34	6.11
PE_5	2.95	4.66	4.02	11.63	3.88
PE_6	2.84	3.30	2.92	9.06	3.02
PE_7	0.20	0.30	0.14	0.64	0.21
Sub – Total	24.32	29.30	21.98	75.60	25.23
GRAND TOTAL	97.94	103.91	75.99	277.91	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	8.25	6.60	4.97	19.82	6.61[a]
PE_2	8.41	5.82	5.70	19.95	6.75[a]
PE_3	3.09	1.43	1.34	5.86	1.95[cd]
PE_4	9.14	5.82	6.11	21.07	7.02[a]
PE_5	5.35	4.58	3.88	13.81	4.60[b]
PE_6	4.94	3.24	3.02	11.2	3.73[bc]
PE_7	0.20	0.22	0.21	0.63	0.21[d]
TOTAL	39.40	27.71	25.23	92.34	
MEAN	5.62	4.01	3.60		4.41

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	20.45	10.23			
Cropping System (CS)	2	48.34	24.17	24.22**	6.94	18.00
Error (a)	4	3.99	0.10			
Potato entries (PE)	6	371.40	61.99	50.33**	2.36	3.35
CS x PE	12	16.82	1.40	1.14[ns]	2.03	2.75
Error (b)	36	44.27	1.23			
TOTAL	62	505.28				

C.V. (A)% = 24.90
C.V. (B)% = 25.14

** - highly significant
ns – not significant

APPENDIX TABLE 34. Harvest index of organically grown potato entries intercropped with bush beans and onion leeks

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
Potato					
PE_1	0.17	0.24	0.24	0.65	0.21
PE_2	0.18	0.24	0.23	0.65	0.21
PE_3	0.15	0.14	0.14	0.43	0.14
PE_4	0.25	0.26	0.25	0.76	0.25
PE_5	0.18	0.20	0.17	0.55	0.18
PE_6	0.17	0.18	0.16	0.51	0.17
PE_7	0.12	0.11	0.11	0.34	0.11
Sub - Total	1.22	1.37	1.30	3.89	1.27
Potato + Beans					
PE_1	0.18	0.21	0.21	0.60	0.20
PE_2	0.19	0.22	0.18	0.60	0.20
PE_3	0.15	0.13	0.15	0.43	0.14
PE_4	0.23	0.25	0.24	0.72	0.24
PE_5	0.19	0.18	0.17	0.54	0.18
PE_6	0.17	0.15	0.15	0.47	0.17
PE_7	0.10	0.10	0.10	0.31	0.10
Sub - Total	1.21	1.24	1.20	3.65	1.23
Potato + Onions					
PE_1	0.19	0.20	0.20	0.59	0.20
PE_2	0.20	0.21	0.17	0.58	0.19
PE_3	0.16	0.17	0.16	0.49	0.16
PE_4	0.23	0.22	0.23	0.68	0.23
PE_5	0.18	0.19	0.18	0.55	0.18
PE_6	0.17	0.17	0.16	0.50	0.17
PE_7	0.11	0.12	0.10	0.33	0.11
Sub – Total	1.24	1.28	1.20	3.72	1.24
GRAND TOTAL	3.67	3.89	3.70	11.26	

TWO WAY TABLE

POTATO ACCESSIONS	CROPPING SYSTEM			TOTAL	MEAN
	CS_0	CS_1	CS_2		
PE_1	0.21	0.20	0.20	0.61	0.20^{ab}
PE_2	0.21	0.20	0.19	0.60	0.20^{ab}
PE_3	0.14	0.14	0.16	0.44	0.15^{bc}
PE_4	0.25	0.24	0.23	0.72	0.24^{a}
PE_5	0.18	0.18	0.18	0.54	0.18^{b}
PE_6	0.17	0.17	0.17	0.51	0.16^{bc}
PE_7	0.11	0.10	0.11	0.32	0.11^{c}
TOTAL	1.27	1.23	1.24	3.74	
MEAN	0.19	0.17	0.18		0.18

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	COMPUTED F	TABULAR F	
					0.05	0.01
Replication	2	0.01	0.00			
Cropping System (CS)	2	0.00	0.00	0.12^{ns}	19.25	99.25
Error (a)	4	0.01	0.00			
Potato entries (PE)	6	0.02	0.00	2.72*	2.36	3.35
CS x PE	12	0.01	0.00	0.69^{ns}	2.03	2.75
Error (b)	36	0.05	0.00			
TOTAL	62	0.10				

C.V. (A)% = 28.39
C.V. (B)% = 23.40

** - highly significant
ns – not significant

APPENDIX TABLE 35. Weight of marketable pods per plot of bush beans grown organically (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_1A_1	0.17	0.11	0.16	0.44	0.15
CS_2A_2	0.25	0.08	0.13	0.46	0.15
CS_3A_3	0.23	0.14	0.28	0.15	0.22
CS_4A_4	0.24	0.13	0.18	0.55	0.18
CS_5A_5	0.23	0.11	0.23	0.57	0.19
CI_6A_7	0.15	0.09	0.23	0.47	0.16
CS_7A_7	0.22	0.11	0.13	0.46	0.15

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARE	MEAN SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.04	0.02			
Treatment	6	0.01	0.00	1.29^{ns}	3.00	4.82
Error	12	0.02	0.00			
TOTAL	20	0.07				

CV% = 22.95

APPENDIX TABLE 36. Weight of non-marketable pods per plot of bush beans per plot grown organically (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_1A_1	0.14	0.07	0.08	0.29	0.10
CS_2A_2	0.20	0.05	0.09	0.34	0.11
CS_3A_3	0.19	0.05	0.10	0.34	0.11
CS_4A_4	0.15	0.04	0.04	0.23	0.08
CS_5A_5	0.16	0.03	0.07	0.26	0.09
CI_6A_7	0.20	0.02	0.08	0.30	0.10
CS_7A_7	0.21	0.06	0.11	0.38	0.13

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARE	MEAN SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.07	0.03			
Treatment	6	0.01	0.00	2.4^{ns}	3.00	4.82
Error	12	0.00	0.00			
TOTAL	20	0.08				

CV% = 18.60

APPENDIX TABLE 37. Total pods per plot of bush beans per plot grown organically (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_1A_1	0.31	0.18	0.24	0.73	0.24
CS_2A_2	0.45	0.13	0.22	0.80	0.27
CS_3A_3	0.42	0.19	0.38	0.99	0.33
CS_4A_4	0.39	0.17	0.22	0.78	0.26
CS_5A_5	0.39	0.14	0.30	0.83	0.28
CI_6A_7	0.35	0.11	0.31	0.77	0.26
CS_7A_7	0.43	0.17	0.2	0.84	0.28

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARE	MEAN SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.19	0.10			
Treatment	6	0.01	0.00	1.05^{ns}	3.00	4.82
Error	12	0.03	0.00			
TOTAL	20	0.23				

CV% = 17.22

APPENDIX TABLE 38. Weight of suitable planting materials per plot of onion grown organically (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
CS_1A_1	0.25	0.25	0.20	0.70	0.23
CS_2A_2	0.40	0.25	0.30	0.95	0.32
CS_3A_3	0.45	0.25	0.25	0.95	0.32
CS_4A_4	0.30	0.30	0.30	0.90	0.30
CS_5A_5	0.35	0.30	0.15	0.80	0.27
CI_6A_7	0.35	0.20	0.30	0.85	0.28
CS_7A_7	0.20	0.35	0.45	1.00	0.33

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARE	MEAN SQUARE	COMPUTED F	TABULAR F	
					.05	.01
Replication	2	0.01	0.01			
Treatment	6	0.02	0.00	0.47^{ns}	3.00	4.82
Error	12	0.09	0.01			
TOTAL	20	0.12				

CV% = 29.81