BIBLIOGRAPHY

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ABSTRACT

The objectives of the study were to determine the fresh pod and seed yield, acceptability and profitability of the ten garden pea entries grown under organic production system in La Trinidad, Benguet; to identify the most suitable garden pea entries under organic production system in La Trinidad, Benguet based on yield, acceptability and profitability; and to document organic production practices employed in growing garden pea in La Trinidad, Benguet.

Based on the results of the study, significant differences were observed among the ten garden pea entries grown under organic production system in La Trinidad, Benguet in terms of number of days from emergence to first harvesting, number of pods per plant, pod width, marketable fresh pod yield per plot, number of seed per pod, and seed yield per plot. CGP 34 had the highest fresh pod and seed yield per plot among the ten garden pea entries evaluated, compared to the check variety (CLG). All the garden pea entries were mild to moderately resistant to leaf miner and powdery mildew. Based on acceptability, CGP 34 was mostly liked by the farmers for its pod characters. Based on profitability, CGP 34,

CGP 13, Taichung, and CLG are the recommended entries for fresh pod and seed yield production under organic production system in La Trinidad, Benguet.

INTRODUCTION

Garden pea (*Pisum sativum L.*) is a cool-season, hardly and tendril-climbing plant that belongs to the Leguminosae family. It is grown for edible green pods and seeds (Mc Collum and Ware, 1980). In the Philippines, it is known as the most expensive vegetable legume. It grows very well in Benguet where the climate is cool throughout the year (PCARRD, 2012). Peas are planted immediately at the closing period of monsoon season and harvest time falls in the month of December to January which is usually cooler than the rest of the year (Jesse, 2000). However, small land areas, high cost of commercial fertilizers and other synthetic chemicals, and pest and disease infestation brought low production yield to farmers (Andres, 2000). In addition, many researches already have proven that the continuous application of chemical fertilizers makes the soil acidic.

This current gap in garden pea production justifies the continuing need to evaluate entries of garden pea to know which are adapted in the place and accepted by farmers that could give them a high yield and quality of seeds that are resistant to pest and diseases. Consumers' preference also must be considered because even if the entry is high yielding but the consumers or farmers dislike the pods and seeds, it might affect the demand and marketability of the product. Moreover , organic farming appears to minimize the cost of production and increase the farmers' profit by producing quality and nutritious vegetables that will not harm the health of our farmers' and consumers (Dela Cruz, 2004).

Through organic farming, the incidence of pest and disease are controlled and the cost of production is decreased. The application of organic fertilizer was found to be a reasonably and more profitable venture (Baswana and Rana, 2007). It also enhances the growth of beneficial bacteria and other microorganisms in the soil which provide the plants with nutrients. In addition, the plant becomes resistant to pest and diseases (Jesse, 2000). In Benguet, farmers could not identify the exact variety of garden pea which could give high yield with good quality pods and seeds which is resistant to pest and diseases. Thus, identifying new varieties of garden pea under organic production system would help a lot of garden pea farmers and health conscious consumers in the locality. Through this study, suitable garden pea varieties in La Trinidad with good quality pods and seeds grown under organic production system and provide nutritious food for consumers may be selected and recommended.

The objectives of the study were to determine the fresh pod and seed yield acceptability and profitability of the ten garden pea entries grown under organic production system in La Trinidad, Benguet; to identify the most suitable garden pea entries under organic production system in La Trinidad, Benguet based on yield, acceptability and profitability; and to document organic production practices employed in growing garden pea in La Trinidad, Benguet.

The study was conducted at Benguet State University experimental area in Balili, La Trinidad, Benguet from November 2012 to February 2013.

REVIEW OF LITERATURE

Organic Farming

Organic farming means farming in the spirit of organic relationships. It is a production system that avoids or largely excludes the use of synthetically produced fertilizers, pesticides, growth regulators and livestock feed additives. The maximum extent feasibility of organic farming systems rely on crop rotation, crop residues, animal manures, green manures, off-farm organic waste, and aspects of biological pest control to maintain the soil productivity tilt. It is also to supply plant nutrients and to control pest (Rai, 2006).

The role of organic agriculture where in farming, processing, distribution, and consumption will sustain and enhance the health of ecosystems and organisms from the smallest in the soil to human beings. In particular, organic agriculture is intended or produces high quality, nutritious food that contributes to preventive health care and well-being. In view of this, it should avoid the use of fertilizers, pesticides, animal drugs and food additives that may have adverse on health effects (IFOAM, 2012).

Organic Fertilizer

Organic fertilizers come from plants and animals. These include animal manure, tankage, blood meal, fish mill, litter, slaughterhouse wastes, compost, green manures, farm residues and sludge. Sludge includes cesspool sediments, drainage canal sediments and septic tank fillers. Manure includes chicken dung, barnyard manure, and guano from bats and birds. Green manures are usually legume crops planted to be plowed under when in bloom in order to add organic materials to the soil especially when it is sandy (Jesse, 2000).

Lantican in 2006 cited that the commercial organic fertilizers are available in the market. Other sources naturally exist as farm waste and manure which farmers can use directly. Organic fertilizers generally contain low amounts of macro elements; the Nitrogen content ranges from 1-7%, phosphorus from 2-12% and potassium from 1-10%.Nutrient content in organic fertilizers is dependent on the source material used and is difficult to standardize commercially unlike chemical fertilizers.

Benefits in Using Organic Fertilizer

Application of organic fertilizer helps conserve the soil, maintain and sustain crop quality and productivity, and protect the environment. Organic fertilizer maintains if not increases the organic matter level in the soil; aids in the formation of organo-metallic complexes; increase soil cation exchange capacity and serves as a conditioner. The addition of organic matter in the soil increases the soil ability to hold water preventing erosion and cracking. It loosens the soil resulting in the better soil aeration, root growth, drainage, improved tillage, improves soil property and increased compaction resistance. Organic fertilizer also improves biological activities of the soil as it enhances the multiplication of the beneficial soil organisms (Jesse, 2000).

In 2006, Rai cited that the results of many field trials including those of the long-term manurial experiments conducted at different centers in India revealed that the combined use of mineral fertilizers and organic manures is the most appropriate method to achieve a higher crop yield. Such a system also provides stability to farming systems where high intensity cropping models are practiced.

In general, the use of organic fertilizer has more special effects. It enhances community health, recycling urban and rural waste and reduces pollution. The use of organic fertilizers reduce farm inputs, thus increase farm income (Jesse, 2000).

Description of the Crop

Garden pea (*Pisum sativum* L.) is locally known in the Philippines as Chinese pea, snow pea, sweet pea or sitsaro as the most expensive legume in the country. It is grown for its edible pods or seeds. It grows very well in Benguet, where the climate is cool throughout the year. It also grows well in humus-rich or volcanic soil and thrives best in areas at least 1,000 m above sea level. Garden pea seeds contain considerable amounts of digestible protein, carbohydrates, and minerals, while the green pods are rich sources of vitamin A. The seed also contains trypsin and chymotrypsin which could be used as contraceptive, ecbolic, fungicide, and spermicide. Dried and powdered seeds can also be used as a poultice on the skin for the treatment of skin complaints (PCARRD, 2012).

Cordillera Administrative Region was the major producer of garden pea at about 94.5%. The organic garden pea is being produced in limited quantities. In 2008, the cost of production was P137, 350/ha with a yield of P7, 000 kg/ha and sold at an average price of P30/kg and a gross income of P210, 000/ha. Recognizing its importance to the industry, PCARRD-DOST identified sweet pea among others, as a priority crop under the National Vegetable R&D Program (PCARRD, 2012).

Effect of Organic Fertilizer on Garden Pea Production

Composting has been considered as a valuable soil amendment for centuries. Most people are aware that using compost is an effective way to increase health plant production,

help save money, reduce the use of chemical fertilizers, and conserve natural resources (Chen and Gloria, 2005).

In 2001, Porocha found that the six tons of alnus compost+90-90-90 NPK/ha could be an alternative to farmers practice in the production of garden pea. The application of alnus compost gave a high marketable yield and return on investment/ha statistically. In terms of pest and disease incidence, plants fertilized with farmers practice,8 tons of alnus compost alone and 6 tons of alnus +90-90-90NPK/ha had the lowest rate of infected leaves.

Compalas and Comadug in 2004 determined the growth and yield response of garden pea to different organic fertilizers as the results show that the plant height, number of days to priming, and average pod width of garden peas treated with organic fertilizers such as compost and chicken manure were comparable with those that were fertilized with inorganic fertilizer such as complete fertilizer (14-14-14) and urea (46-0-0). Moreover, garden peas applied with organic fertilizers flowered earlier that those were applied with inorganic fertilizers. The length and number of pods per hill of peas treated with inorganic fertilizers and chicken manure are comparable. As a result, the high ROE can be realized either using inorganic or organic fertilizers.

Varietal Evaluation of Garden Pea

In 2000, Bay-an evaluated six varieties of garden pea in Atok, Benguet. This varieties were CGP 18A, CDG, 89-100, Trinidad, Chinese and Taichung. Among the six varieties evaluated, CGP 18A was the first to produce flower and mature, followed by Chinese, 89-100, Trinidad and CDG. She recommended Taichung to replace the old favorite cultivar of garden pea which is Chinese and CDG based on its characteristics.

In 2005, Paganas reported the result of his study in the evaluation of commercially grown garden pea varieties. Among the five varieties tested, CGP 39 and kalantao had the highest number of pods per plant. In addition, Chinese white, CGP 39 and 89-001 produced more seeds per pod than the other varieties; while kalantao also was the top yielder per hectare. It was also revealed that all varieties of garden pea exhibited have mild resistance to leaf miner and powdery mildew.

Gawidan in 2006 reported that N335, CGP 34, 89-001 and CLG had the significantly highest fresh pod yield among the ten entries of garden pea she evaluated. While CGP 34 and CGP 110 had significantly has the highest seed yield per plot and per hectare.

In 2009, Del-amen evaluated the performance and acceptability of six promising lines of garden pea. He reported that the six promising lines of garden pea were suitable in Madaymen, Kibungan, Benguet because of their good growth and fresh pod yield that ranged from 8.65-11.43kg/10m^2. He further stated that all of the promising lines were all vigorous and highly resistant to leaf miner and powdery mildew except for the CGP 18 which had mild resistant to powdery mildew. CGP 34 and CGP 110 were the tallest while Kalantao was the shortest at 35DAP.While CGP 110 and Kalantao produced the highest marketable and total fresh pod yield per plot but kalantao was disliked by the farmers because of its big size and curve pods despite of its sweetness and crunchiness.

On the other hand, Bangsoyao 2009 determines the effect of inoculation on the nodulation, growth and seed yield of garden pea. As the result showed that rhizobium inoculation significantly affected the nodule and seed yield of garden pea accessions. Among the six garden pea accession inoculated, CLG, CGP 34 and CGP 13 produced the

highest seed per plot. She further stated that, inoculation of seed before planting helps to enhance more nodules and gives high seed yield of garden pea. Moreover, in terms of the return on cash expense, inoculation gave the highest return of 11.53%.

Subelan in 2006 characterizes the diversity and cluster analysis of different accessions of garden pea under La Trinidad, Benguet. Out of 154 accessions, 20 were selected and identified as promising materials for commercialization because of their prolificacy and pod quality. The computed diversity indexes for quantitative character ranged from 0.63 to 0.99 w/ a mean diversity index of 0.87.The diversity indexes for quantitative character ranges from 0.34 to 0.99 with a mean diversity index of 0.73. All the characters observed in diversity indexes gave an overall mean diversity index of 0.80. This indicates a high variation within the collection. However, the eleven accessions selected by Sugot (2010) had a significant difference in the Agro morphological characters she observed, based from the result, the diversity indexes for qualitative characters ranged from 0.72 to 0.98 with a mean of 0.89. While the diversity indexes for quantitative characters ranged from 0.3 to 58. This indicates low variation among the quantitative characters measured. However, CGP 13, Chinese pea and CGP 34 are among the accessions that produced flowers and pods earlier. While CGP 116, produce the highest number of seeds per pod and total fresh pod yield.

Dayag-an (2010) evaluated ten promising lines of garden pea applied with organic fertilizer in La Trinidad, Benguet. The result of her study showed that CLG, CGP110, 89-001 and CGP 18A were the best promising lines based on their maturity, growth and fresh pod yield. They also gave the highest ROCE. However, organic fertilizer such as mushroom compost and vermicompost will delay first harvesting and will reduce fresh pod

length, but vermicompost application increased marketable and total fresh pod yield of garden pea.

Cuyasen in 2010 revealed that Semi Chinese Violet and Semi Chinese White were the earliest to mature, tallest plant, had numerous nodes, numerous numbers of pods per plant, and had the highest number of seed per pod. All the four varieties tested were moderately resistant to leaf miner and moderately susceptible to leaf spot and powdery mildew. Taichung had the longest and widest pod, had the heaviest marketable pods, highest total pod yield per plot, highest computed yield per hectare and highest ROCE. Furthermore, Organic-based fertilizer application improved the growth, the weight of marketable pods, the weight of total yield of the garden pea and the ROCE.

Donglal in 2011 also characterized and evaluated seven advanced lines of garden pea. Based on the result of the study, the agro morphological characteristics, growth and fresh pod yield under La Trinidad, Benguet differed significantly in majority of the parameters among all the lines evaluated. All of the selected advanced lines emerged in seven DAS, flowered within 30-60 DAE, set pod from 40-51 DAE and matured five to seven days from pod setting. Based on the cost and return analysis from growing the selected advance lines, line 153-1 gave the highest profit followed by lines 153-2 and 109-2. However, line 109-1 and CLG were the most accepted and very much liked by the farmers due to their pod characteristics and low weight loss during storage.

MATERIALS AND METHODS

An area of 450 m² was thoroughly cleaned and prepared (Figure 1). The area was divided into three blocks consisting of 90 plots with a dimension of 0.75m x 5m. Three plots were devoted to one treatment per replication. The two outer plots were used for seed production and the inner plot was for fresh pod production. The experiment was laid- out using Randomized Complete Block Design (RCBD) with three replications (Figure 2).

The treatments used were:

Code	Entry	Source
E1	CGP34	BSU-IPB HCRS
E2	Betag	BSU-IPB HCRS
E3	CGP 59	BSU-IPB HCRS
E4	CGP 13	BSU-IPB HCRS
E5	DK-30	SUNRISE FARM SUPPLY
E6	CGP 110	BSU-IPB HCRS
E7	CGP 11	BSU-IPB HCRS
E8	CGP 154	BSU-IPB HCRS
E9	TAICHUNG	SUNRISE FARM SUPPLY
E10	Chinese light green (ck)	BSU-IPB HCRS

Two seeds per hill were sown at a depth of 2-5cm with a distance of 25cm between hills and between rows (Figure 3). There were two rows per plot. All necessary cultural management practices in organic farming done in garden pea was employed uniformly such as irrigation, cultivation, weeding by hand pulling and pest control like manual crushing were done. Spraying of 100 ml extract of garlic, 60ml of oil plus 1 egg yolk at 16 liters of water was mixed to control powdery mildew. Watering was done after planting at 2-3x a week as needed (Figure 4). The trellises were provided at 30 days after planting (Figure 5); the vines were bound with plastic twine to allow the plant to cling to the trellises (Figure 6). Basal application of Vermicompost (2.5kg/5m^2) was mixed thoroughly with the soil. Some cultural management practices in organic farming system were also documented throughout the study.

Data Gathered

1. Meteorological data. Relative humidity, temperature, rainfall and sunshine duration daily was taken from the BSU-PAGASA (Benguet State University-Philippine Atmospheric Geophysical and Astronomical Services Administration).

2. Soil chemical properties. Soil sampling was done from the experimental area before and after the conduct of the study and was analyzed for soil pH, organic matter, and NPK in San Fernando, La Union.

3. Description of the area. This was focused on the cropping system employed in the area. It was asked from the previous farmer or manager of the experimental station.

4. Number of days from sowing to emergence. This was recorded by counting the number of days from sowing to emergence.

5. Number of days from emergence to flowering. This was recorded by counting the number of days from emergence to the time when at least 50% of the plant per plot had at least two fully opened flowers.

6. Number of days from flowering to pod setting. This was obtained by counting the number of days from flowering until the pods begin to develop.

7. Number of days from pod setting to pod maturity. This was recorded by counting the number of days from pod setting to pod maturity.

8. Number of days from emergence to first and last harvesting. This was recorded by counting the number of days from flowering to first and last harvesting per treatment.

9. Number of flower per cluster. This was obtained by counting the number of flowers per cluster from 10 sample cluster per treatment.

10. Number of pods per cluster. This was obtained by counting the number of pods from 10 sample cluster per treatment.

11. Number of pods per plant. This was recorded by counting the number of pods from 10 sample plants per replication.

12. Pod length (cm). Pod length of ten sample pods per treatment was measured from pedicel end to blossom end using foot rule.

13. Pod width (cm). Pod width of 10 sample pods per treatment was measured using foot rule.

14. Weight of marketable fresh pods per plot (kg/3.75m²). This was recorded by weighing the marketable pods per plot from first to last harvest from the inner plot per treatment.

15. Weight of non-marketable fresh pods per plot (kg/3.75m²). This was recorded by weighing the non marketable pods per plot.

16. Total fresh yield per plot (kg/3.75m²). This was recorded by getting the total weight of marketable and non-marketable pods per plot throughout the harvesting period.

17. Computed fresh pod yield per hectare (tons/ha). This was recorded by multiplying the total yield per plot in kg/3.75m² x 2.66; where 2.66 is the factor used to convert yield per plot (kg/3.75m²) in tons/ha assuming one hectare effective area.

18. Number of seed per pod. The number of seed per pod from 10 sample pods was counted and recorded.

19. Seed diameter (cm). The diameter of the seed was measure at harvest from 10 sample seed selected at random. This was measured parallel from the haulm using vernier caliper.

20. Weigh of 100 the seeds (g). Harvested seeds were sundried continuously for eight days to lower the moisture content to about 10% .One hundred seeds were randomly picked and weighed per treatment.

21. Total seed yield per plot (kg/7.5m²). This was the total seed yield harvested per plot taken after eight days of continuous sun drying.

22. Computed seed yield per hectare (tons/ha). This was recorded by multiplying the total yield per plot in kg/7.50m² x 1.33; where 1.33 is the factor used to convert yield per plot (kg/7.5m²) in tons/ha assuming one hectare effective area.

23. Reaction to leaf miner infestation. This was gathered using the following scale used by Tandang *et al*.in 2008:

Scale	Description	Remarks
1	No damage/infestation	highly resistant
2	1-25% infestation	moderately resistant
3	25-50% infestation	mildly resistant
4	51-75% infestation	susceptible
5	76-100% infestation	very susceptible

24. Reaction to Powdery mildew. This was gathered using the following scale used by Tandang *et al*.in 2008:

Scale	Description	Remarks
1	No damage/infection	highly resistant
2	1-25% of the total leaves per plants/ per plot are infected	moderately resistant
3	25-50% of the total leaves per plants/ per plot are infected	mildly resistant
4	51-75% of the total leaves per plants/ per plot are infected	moderately susceptible
5	76-100% of the total leaves per plants/ per plot are infected	very susceptible

25. Farmers acceptability. During the peak of harvest, ten farmers were invited to make their own selection and express their reasons for accepting and not accepting the selected garden pea entries. The selection was based on the fresh pod quality after harvest. Acceptability rating of garden pea in 2013 was used as follows:

Scale	Remarks
1	Dislike very much
2	Moderately dislike
3	Like
4	Moderately like

5 Like very much

26. Return on cash expenses (ROCE). This was determined using the following formula:

$$\text{ROCE (\%)} = \frac{\text{Gross sales} - \text{Total expenses}}{\text{Total expenses}} \times 100$$

Analysis of Data

All quantitative data was analyzed using the analysis of variance (ANOVA) for Randomized Complete Block Design (RCBD) with three replications. The significance of differences among treatments means was tested using Least Significant Difference (LSD) at 5% level and 1% of acceptance.

RESULTS AND DISCUSSION

Agro- meteorological Data

The monthly temperature, relative humidity, rainfall amount and daily sunshine duration during the conduct of study are shown in Table 1. The monthly air temperature ranged from 11.8 ºC to 23.7 ºC. Garden pea production is favored by a cool climate with a temperature ranging from 10ºC to 18ºC (PCARRD, 2012). The relative humidity recorded ranged from 80.00% to 86.50% is also favorable for garden pea production. Little rainfall amount was observed, thus supplementary irrigation during the vegetative stage and pod development of the plant was done to provide the water requirement of garden pea. The daily sunshine duration ranged from 329.00 minutes to 377.70 minutes which is ideal for garden pea production.

Table 1. Temperature, relative humidity, rainfall, daily sunshine duration from November 2012 to February 2013

MONTH	TEMPERATURE C^O MIN	MAX	MEAN	RELATIVE HUMIDITY (%)	RAINFALL (mm)	DAILY SUNSHINE DURATION (min)
November	13.10	20.90	17.00	84.75	1.33	329.00
December	13.20	22.60	17.90	86.50	0.15	377.70
January	18.90	23.70	21.30	80.00	0.50	360.00
February	11.80	17.50	14.70	68.00	0.29	330.20
Mean	14.25	21.18	17.73	79.81	0.57	349.23

Source: Philippine Atmospheric Geophysical and Astronomical Services Administration (PAG-ASA) BSU, La Trinidad, Benguet

Soil Chemical Properties

Table 2 shows that the soil samples taken before and after the conduct of the study had not changed in the nitrogen, organic matter and pH of the soil. The phosphorus content of the soil had increased from 160.00 to 200.00 parts per million while potassium also increased from 240.00 to 242.00 parts per million. The increase of phosphorus and potassium after the conduct of the study was due to the application of vermi compost used. As Lantican (2006) cited that the nutrient content in organic fertilizer is dependent on the source used.

Description of the Area

The area was located at Balili, La Trinidad, Benguet. The elevation ranged from 1,400 to 1600 meters above sea level with an average temperature of 26ºC at maximum and 16ºC at minimum which is favorable for garden pea production. From 2010 to 2012, legumes were planted in the area under organic production. The area was used for thesis on organic production of bush and pole snap beans and petchay seed production under organic production system and laboratory exercises on seed inoculation of indigenous microorganisms isolated by BSU. Different composts were also used as fertilizers during the utilization of the area.

Table 2. Soil chemical properties before planting and after harvest

SOIL SAMPLE	pH	OM (%)	N (%)	P (ppm)	K (ppm)
Before planting	6.00	2.00	1.00	160.00	240.00

After harvest	6.00	2.00	1.00	200.00	242.00

Analyzed by: Soils Laboratory in San Fernando, La Union

Days from Sowing to
Emergence and Flowering, and from
Flowering to Pod Setting and Pod Maturity

The ten garden pea entries evaluated emerged at 7 days after sowing. On the number of days from flowering to pod setting, most of the entries set pods after six days, while DK-30 took eight days to pod setting.

No significant differences were observed in Table 3 in terms of number of days from emergence to flowering, flowering to pod setting and from pod setting to pod maturity. It was observed that the number of days from emergence to flowering ranged from 30 days to 44 days. DK-30 was the earliest to produce flower at 30 days as compared to the check variety CLG, while CGP 34 was the last to flower at 44 days after emergence (Figure 9).

Pod maturity from flowering was observed to be variable, DK-30 and CLG were the earliest to mature within 5 days after pod setting, followed by CGP 34 and CGP 13 (6) while the latest to mature were Betag (10), CGP 59(11) and CGP 11(12) entries.

SUMMARY, CONCLUSIONS AND RECOMMENDATION

Summary

The ten garden pea entries evaluated emerged at seven days after sowing. The flowering ranges from 30-44 days after emergence and set pods at 6-8 days and matures at 5-12 days from flowering. DK-30 was the earliest to bear flower and was first harvested. CGP 34, CGP 13, DK-30 and CLG have to flowers per cluster. One hundred percent pod setting was observed.CGP 13 had the highest pods per plot having two pods per cluster. Numerically CGP 13 had the longest pods and widest pod that would mean higher weight and profit of fresh pods.

On the other hand, CGP 34 produced the highest number of seed per pod and CGP 13 had the widest seed among the entries evaluated. In the weight of 100 seeds Betag was heaviest having 18.67 grams. All entries were resistant to leafminer and powdery mildew. However, spraying was done to control the infestation of pest and disease. CGP 34 had produced the highest weight of pods (0.73 kg/15m^2) and CGP 34 and CLG had the heaviest weight of seeds. In terms of the net income in fresh pods CGP 34, Taichung and CLG were noted to have the highest income and ROCE. While in seed production, all of the entries had a negative ROCE due to the damage brought by early infestation of pest and diseases.

Conclusions

Based from the result of the study, CGP 34 had significantly highest fresh pod and yield among the ten entries of garden pea grown under organic production in La Trinidad, Benguet. All of the ten entries were accepted by the farmers for its quality pod characters. Growing CGP 34, Taichung, and CLG were profitable ranged from 9.78% to 27.89%. CGP 34 was recorded with the highest ROCE. CGP 34, Taichung, and CLG were the entries grown profitable under organic production system in La Trinidad, Benguet.

Recommendation

CGP 34, CGP 13, Taichung and CLG are the recommended entries for fresh pod and seed production under organic production system in La Trinidad, Benguet. However, all of the entries can be also grown in terms of yield and qualitative performance.

LITERATURE CITED

ANDRES, T. 2000. Highland Agriculture R&D highlights. Department of Agriculture Region 1: BFI Complex, Guisad, Baguio City. Pp. 34-35.

BANGSOYAO, E. K. 2009. Effect of inoculation on the seed yield of garden pea accessions under Bangao, Bugias, Benguet condition. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 31.

BASWANA, K. S and M. K. RANA. 2007. Effect of organic sources and biofertilizer on growth and yield of garden pea (*Pisum sativum L.*). Retrieved on July26, 2012from(http://www.cabdirect.org/abstracts/20093253056.html;jsessionid=A31046E6BCAEA6543423152F5CC915C2*).*

BAY-AN, N. B. 2000. Performance and acceptability of promising garden pea in Atok, Benguet. BS Thesis. Benguet State University, La Trinidad, Benguet.P.36.

CHEN, Z. S and C. B. GLORIA. 2005. Compost Production: A manual for Asian farmers. Food and fertilizer technology center for the Asian for Pacific region.Taipei 106, Taiwan ROC Pp. 2-21.

COMADUG, V. S and R. L COMPALAS.2004. Response of garden pea (Pisum sativum) to different organic fertilizers. Retrived on July26, 2012from (http://agris.fao.org/agrissearch/search/display.do?f=2006%2FPH%2FPHO603.xm1%3BPH2006V00004).

CUYASEN, B. M. 2010. Yield and profitability of four garden pea varieties applied with different organic-based fertilizers in La Trinidad, Benguet. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 8.

DAYAG-AN, J. G. 2010. Growth and yield of ten promising lines of garden pea applied with organic fertilizer in La Trinidad, Benguet. BS thesis. Benguet State University, La Trinidad, Benguet. P. 42-43.

DELA CRUZ R. T. 2004. Growing vegetable organically. BAR-R&D Digest Bureau of Agricultural Research, Department of Agriculture. Pp 1-2.

DEL-AMEN, M.2009. Growth, yield and farmer's acceptability of promising lines of garden pea. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 2.

DONGLAL, G. P. 2011. Growth, fresh pod yield, acceptability and post-harvest quality of selected advanced lines of garden pea. BS Thesis. Benguet State University, La Trinidad, Benguet. P.11.

GAWIDAN, L. P. 2006. Fresh pod and seed yield of garden pea entries in La Trinidad, Benguet.BS Thesis. Benguet State University, La Trinidad, Benguet. Pp . 4, 17-18.

INTERNATIONAL FEDERATION OF ORGANIC AGRICULTURE MOVEMENT. 2012. The principle of Organic agriculture. Retrieved on August 08, 2012 from (http://www.ifoam.org/index.html).

JESSE D. D. 2000. Farm crop production and agro-forestry: Organic gardening. Rex Books store Inc.: Manila, Philippines. Pp. 59-61.

LAB-OYAN, C. F. 2011. Yield performance of two garden pea varieties (*Pisum sativum*) as influenced by rates of vermicompost. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 24-25.

LANTICAN, R. M. 2001. The Science and practice of crop production. Los Baños, Laguna: SEAMEO SEARCA and UPLB College. Pp. 169-171.

McCOLLUM, J. P and G. W. WARE. 1980. Producing vegetable crops, 3rd Edition. The Interstate Printers and Publishers Inc. United States of America. P. 379.

PAGANAS, A. M. 2005. Characterization and evaluation of commercially grown garden pea varieties in Benguet. BS Thesis. Benguet State University, La Trinidad, Benguet. Pp. 7-9.

POROCHA, N. C. 2001. Effects of different rates of alnus compost ongrowth and yield performance of garden pea. BS Thesis. Benguet State University, La Trinidad Benguet. P. 28.

PHILIPPINE COUNCIL FOR AGRICULTURE, FORESTY AND NATURAL RESEARCH AND DEVELOPMENT (PCARRD). 2012.Retrieve on July 20, 2012from(http://maidon.pcarrd.dost.gov.ph/joomla/index.php/option=comcontent &task=view&id=883& ltemid=590).

PHILIPPINE COUNCIL FOR AGRICULTURE, FORESTY AND NATURAL RESEARCH AND DEVELOPMENT (PCARRD.2012). Sweet pea production guide:PCARRD information Bulletin No. 275/2008.Retrieve on July 20, 2012 from(http://maidon.pcarrd.dost.gov.ph/joomla/index.php/option=comcontent&tas k=view&id=883& ltemid=590).

RAI, M. K. 2006. Handbook of microbial biofertilizers. Haworth press Inc. Pp 226-229.

SUBELAN, R. G. 2006. Characterization, Diversity and Cluster analysis of different accessions of garden pea under La Trinidad, Benguet. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 11.

SUGOT, A. G. 2010. Agro morphological Diversity and Cluster analysis of eleven selected accessions of garden pea in La Trinidad, Benguet. BS thesis. Benguet State University, La Trinidad, Benguet. P. 39.

TANDANG, L. L, 2006. Development of Snap bean (*Phaseolus vulgaris*) and Garden pea (*Pisum sativum*) in Benguet. Philippine Agriculture Resource Research Foundation Inc. (PARRFI). Pp. 141-148.

TANDANG, L. L. , KIMEU, A . M . , AMLOS, B. B. , BAGTILA, J. G. , KEBASAN, B. B. , and C. R MAGHIRANG. 2008. Benguet State University In-House reviews. Report formats for completed projects. Benguet State University, La Trinidad, Benguet. P. 19.