

Original Research Article

INTEGRATION OF MUNGBEAN (*Vigna radiata* L.) AS CASH CROP ON SHADED LAND IN MID-ELEVATION AREAS OF CONNER, APAYAO

ABSTRACT

The study was conducted to determine the growth and yield of mungbean integrated as a cash crop in Barangay Guina-ang, Conner, Apayao. The four mungbean varieties, NSIC Mg 05 – Pag-asa 11, NSIC Mg 12 – Pag-asa 19, NSIC Mg 09 – Pag-asa 15, and NSIC Mg 17 – Pag-asa 17 were planted in the partially-shaded areas with slopes not exceeding 50 degrees. It was laid out in 5 m x 10 m quadrants arranged in Randomized Complete Block Design (RCBD) with three replications. Results of the study revealed that V1 and V2 were late maturing (86.50; 87.16), taller (65.25; 68.85 cm), had more pods per plant (16.72; 15.92), longer pod length (9.42; 9.36 cm), more seeds per pod (12.42; 10.88), heavier seed weight (33.46; 28.49 g) and higher seed yield (656.45; 610.20 kg/ha) as compared to the varieties with early maturity V3 and V4 that was significantly different up to 1% level DMRT. The means between the different cropping combinations of the CAFÉ Project had no significant difference from one another except for plant height.

Comment [U1]: How far the shade level...?

Comment [U2]:
Adjust with the suggestions in the conclusion!

Keywords: mungbean, cash crop, cropping combinations, maturity, potential yield

INTRODUCTION

Mungbean, *Vigna radiata* L belongs to Family Leguminosae whose determining characteristics is their ability to fix atmospheric nitrogen (N) [1]. Furthermore, mungbean seeds contain 24.7% protein, 0.6% fat, 0.9% fiber, and 3.7% ash, and a sufficient quantity of calcium, phosphorus, and important vitamins. It has been a source of protein. Mungbean is an important short-duration crop in Pakistan [2].

In the Philippines, mungbean (*Vigna radiata* L.), are small green legumes grown widely for use as a human food but can be used as a green manure crop and as forage for livestock. It is a tropical or sub-tropical crop, and requires warm temperatures, annuals, highly branched, and having trifoliate leaves, upright and vine types of growth habit occur in mungbean, with plants varying from one to five feet in length. It is a drought-tolerant crop and requires a warm climate during its growing period.

Due to the nutritional benefits and importance of legumes, Apayao State College established the CAFÉ project utilizing mungbean as a cash crop, to promote the intercropping of the crop in a semi shaded and rolling areas and to maximize the utilization of the site as the fruit trees and other cash crops. Although this is an opportunity cropping where agricultural and climatic conditions were not ideal, i.e. soil moisture were low, the consequence of being low yielding and high risk crop is imminent, this study, using four mungbean varieties, evaluate growth and yield performance on the partially shaded areas of the CAFÉ Project in Barangay Guina-ang, Conner, Apayao.

Comment [U3]: The aim of this study was to determine the growth and yield of mung beans on shaded land, it is necessary to add research results on the effect of shade on the growth and yield of mung beans. How far is the tolerance of mung beans to the level of shade

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OBJECTIVES

This study was conducted to determine the growth and yield of mungbean integrated as a cash crop in the CAFÉ Project site. Specifically, it was conducted to determine the performance of mungbean in the partially shaded areas in terms of growth duration, plant height, branches per plant, pods per plant, pod length, seeds per pod, the weight of 1,000 seeds and seed yield (t/ha).

METHODOLOGY

Selection of Mungbean Varieties

Four mungbean varieties which were commonly planted by the farmers in the locality were chosen as experimental plants. The seeds were procured at an agricultural store and were coded accordingly. The varieties were:

- V1- NSIC Mg 05 – Pag-asa 11
- V2- NSIC Mg 12 – Pag-asa 19
- V3- NSIC Mg 09 – Pag-asa 15
- V4- NSIC Mg 17 – Pag-asa 17

Experimental Treatments and Design.

The mungbean experimental site was laid out in 5 m x 10 m quadrants, arranged in Randomized Complete Block Design (RCBD) with three replications.

Planting

Mungbean seeds were planted on the 1st week of February using the traditional dibble method with an approximated distances of 12" x 12" on 2-3 seeds per hill. Replanting of missing hills was done within 7 days after seeding (DAS).

Comment [U4]:
What is the unit of spacing used?.....cm or
inche.....?

Inter Tillage and Cultural Management

Weeding was done manually and the weed materials were used as mulching for the mungbean plants. Since the study area was in a hilly forest zone, the plants were dependent on rainfall for its water needs.

Nutrient Management

Fertilizer application of complete (14-14-14) and urea (46-0-0) fertilizers at the rate of 20 grams per hill dibbled 3-4 inches away from the base of the plants was done at 25 DAS .

Harvesting and Determination of Yield

The matured dried pods were gathered on a priming basis, sun dried, threshed, and winnowed to remove the trash. Cleaned seeds were sundried and weighted. Sample pods were also selected randomly per treatment for the data on other yield components.

Statistical Analysis of Data

Data gathered for various characteristics were subjected to Analysis of Variance using the SPSS Statistical Package and means were compared through the Duncans' Multiple Range Test (DMRT) at 5% level of probability [4].

RESULTS AND DISCUSSION

A. Growth Parameters

Growth Duration

As gleaned in Table 1, V2 had the longest duration with 87.16 days which was statistically similar with V1 (86.50), while V3 and V4 had a mean of 79.00 and 78.25 respectively. Data supports that V1 and V2 can be considered late maturing varieties while V3 and V4 matures early. The study of [5] had almost similar data when the mungbean was planted in the early part of March.

Analysis of Variation revealed that means between the different treatments in the CAFÉ project showed no difference while means between mungbean varieties were significant at 1% level DMRT with a coefficient of variation computed at 0.35% and 4.58%, respectively.

Plant Height (cm)

The tallest variety was observed on V2 with a mean of 68.85 cm followed by V1 (65.25 cm), V4 (51.20 cm), and V3 with 49.20 cm, respectively. As observed, the late maturing varieties were also taller than the early maturing ones. The data gathered was parallel to the findings of [6] which reported that late maturing varieties had a plant height range from 56.60 – 60.30 cm while the early maturing was from 38.20 – 40.30 cm. Furthermore, the taller plants in the CAFÉ Project site may be attributed to the shading effect of the trees in the area as plants that are subjected to a poor or localized light source become drawn or etiolated as they try to reach more light [7].

ANOVA computation showed that both the cropping combinations and mungbean varieties have a significant differences at 5% level and coefficient of variation at 4.21% and 6.22% respectively.

Branch per Plant

More branches were recorded in early maturing varieties, V3 with 3.45 and V4 (3.32), than the late maturing varieties which posted 3.16 for V1 and 3.28 for V2. However, there was no significant difference in the means between the different mungbean varieties and the different cropping combinations of the CAFÉ Project.

Comment [U5]:

1) Because the objective of this research is to determine the performance of mungbean in the shaded lands, it is necessary to add data on the degree of shade on the land used for this study. This is important as a basis for making conclusions.
2) Add a discussion whether the level of shade on the land used is still within the tolerance limits of mungbean?

Comment [U6]:

What is the shade level...?

Table 1. Growth parameters of mungbean integrated as a cash crop

Varieties	Growth Duration (days)	Plant Height (cm)	Branch per plant
V1- NSIC Mg 05 – Pag-asa 11	86.50a	65.25b	3.16
V2- NSIC Mg 12 – Pag-asa 19	87.16a	68.85a	3.28
V3- NSIC Mg 09 – Pag-asa 15	79.00b	49.4c	3.45
V4- NSIC Mg 17 – Pag-asa 17	78.25b	51.2c	3.32
c.v. (%)	4.58	6.22	1.14
Level of significance	0.01	0.05	NS

B. Reproductive Parameters

Pods per Plant

The late maturing varieties, V1 and V2 produced the most number of pods per plant with means of 16.72 and 15.98 as compared to the early maturing varieties V4 (15.18) and V3 (15.14). The result jives with the findings of [6] which characterized the late maturing varieties as high yielding as brought about by the more number of pods per plant.

Analysis of variation showed that means between the different mungbean varieties were significantly different at 5% level DMRT but there was no significance between the cropping combinations in the CAFÉ site where the varieties were planted.

Length (cm) of Pods

Longer pods were observed from the late maturing varieties, V1 (9.56) and V2 (9.36), as compared to early maturing V3 (7.24) and V4 (7.56). This finding can be attributed to the characteristics of the mungbean HYVs [6] .

Analysis of ~~Variation~~-Variance revealed that means between the different treatments in the CAFÉ project showed no difference while means between mungbean varieties were significant at 1% level DMRT with the coefficient of variation computed at 1.96% and 5.24% respectively.

Number of Seeds per Pod

Variety 1 had the most number of seeds per pod with a mean of 11.42 followed by V2 (10.88), V3 (8.85), and V4 (8.32). ANOVA showed that means were significant at 1% level DMRT with a coefficient of variation computed at 8.67%. A Comparison of means on the different cropping combinations in the CAFÉ site showed no significant difference.

Table 2. Reproductive parameters of mungbean integrated as cash crop

varieties	Pods per Plant	Length of Pods (cm)	Number Seeds per Pod
V1- NSIC Mg 05 – Pag-asa 11	16.72a	9.56a	11.42a
V2- NSIC Mg 12 – Pag-asa 19	15.98a	9.36a	10.88b
V3- NSIC Mg 09 – Pag-asa 15	15.14b	7.24b	8.85c
V4- NSIC Mg 17 – Pag-asa 17	15.28b	7.56b	8.32c
c.v. (%)	3.85	5.24	8.67

Level of significance	0.05	0.01	0.01
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C. Yield Parameters

Weight of 1,000 Seeds

The heaviest weight of seeds was recorded on V1 ~~with~~ at 33.46g followed by V2 (28.49), V4 (25.12), and V3 (24.35). It can be gleaned that the late maturing varieties registered heavier weight of seeds and as compared to the varieties with early maturity. This can be due to the bigger seeds attributed by the mungbeans with later maturity which was also the high yielding. Analysis of Variation revealed that means between the different treatments in the CAFÉ project showed no difference while means between mungbean varieties were significant at 5% level DMRT with a coefficient of variation computed at 0.79% and 7.36% respectively.

Seed Yield (t/ha)

The seed yield of the late maturing varieties V1 (876.45) and V2 (810.20) were higher as compared to the varieties with earlier maturity V3 (632.70) and V4 (675.35). The higher yield can be attributed to the more number of pods per plant, longer pod length, more seeds per pod, and heavier weight of seeds of the late maturing varieties.

Although the seed yield was lower compared to the potential yield of the varieties tested (PNS/BAFPPS, 2012), it was still considered high owing to the fact that the study was conducted under the partially shaded areas of the CAFÉ Project.

Table 3. Yield parameters of mungbean integrated as cash crop at the CAFÉ Site

Varieties	Weight of 1,000 seeds (g)	Seed Yield (kg/ha)
V1- NSIC Mg 05 – Pag-asa 11	33.46a	876.45a
V2- NSIC Mg 12 – Pag-asa 19	28.49b	810.20b
V3- NSIC Mg 09 – Pag-asa 15	24.35c	632.70d
V4- NSIC Mg 17 – Pag-asa 17	25.12c	675.35c
c.v. (%)	7.36	3.74
Level of significance	0.05	0.01

CONCLUSION

The late maturing varieties V1 (NSIC Mg 05 – Pag-asa 11) and V2 (NSIC Mg 12 – Pag-asa 19) were taller (65.25; 68.85 cm), had more pods per plant (16.72; 15.92), longer pod length (9.42; 9.36cm) more seeds per pod (12.42; 10.88), heavier seed weight (33.46; 28.49g) and higher seed yield (876.45; 810.20 kg/ha) as compared to the varieties with early maturity V3

Comment [U7]:

Conclusions should be based on shade level. For example, on the CAFÉ Project lands with a degree of shade...%, the late maturing mungbean varieties V1 (NSIC Mg 05 – Aug 11) and V2 (NSIC Mg 12 – Aug 19) can be developed better than early maturing mungbean varieties V3 (...) and V4(...). These varieties were able to grow better and produce higher seeds, namely 876 kg/ha, 810 kg/ha, 632 kg/ha and 675 kg/ha, respectively.

(NSIC Mg 09 – Pag-asa 15) and V4 (NSIC Mg 17 – Pag-asa 17) that was significantly different up to 1% level DMRT.

RECOMMENDATIONS

Based on the foregoing results and conclusion, the following recommendations were forwarded:

1. Planting of mungbean under a favorable, partially-shaded, forest-based ecosystem should be promoted to augment the meager income of the upland farmers;
2. Production of IEC materials for the promotion of the generated technology.

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Comment [U8]:

The references in this manuscript are mostly too old and too poor, so more references need to be added.

Comment [U9]:

Reference is too old

Comment [U10]:

Reference is too old

Comment [U11]:

Reference is too old

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Comment [U12]: Reference is too old

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