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Varietal response of white potato to fertilization under lowland conditions

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Abstract

A study was conducted to determine the white potato variety best adapted to and the best NPK level for lowland conditions. The results showed that Isola significantly out grew the rest of varieties 30 days after emergence (DAE) but Cosima, Granola, Ilona, and Fina caught up 45 DAE, Linda was the tallest before vine cutting. The highest number of mainstems, which differed significantly from those taken from the rest of the varieties, were produced by Berolina, Franza, Monza, and Romanze. Greta, Ronea, Romanze and Ilona produced the highest number of lateral branches with Ilona producing the earliest. Fresh and dry weights of produce haulms significantly increased in Ronea and Romanze. Isola was most tolerant to insect pest infestations one week before vine killing.

Keywords: White potato, fertilization, lowland condition

1. Introduction

White potato (*Solanum tuberosum* Linn) is one of the most valuable crops produced in Benguet. It is one of the principal sources of income of farmers. The potato ranks highest in terms of nutritive value and productivity (CIP, 1984) [2]. It can be prepared into mashed potato, potato chips, flour and as an excellent mixture for pork adobo. Nutritionally, it is a good source of minerals such as phosphorous, potassium and iron, and vitamins A, C and D (Knott and Deanon, 1967) [1]. Uichanco (1959) mentioned that potatoes are good source of dextrose agar in the culture of mold and fungi and micro-biological studies.

The lack of sufficient supply of table potatoes in the lowlands is one of the problems being encountered by the consumers in these places. Factories and corporation have difficulty in getting supply of potatoes to run their business operations; thus, with the inadequate supply of potatoes in the market, potato price is raised. Another problem is the high cost of petroleum based products such as inorganic fertilizers brought about by the oil crisis. The depletion of natural mineral deposits as sources of fertilizers also adds to the shortage of this vital input in crop production.

2. Materials and Methods

An area of about 1,125 m² was prepared and divided into 4 blocks. Furrows with a distance of 0.75 m each with a length of 5 m in each block was done. The experiment was laid-out in a split-plot arrangement following the randomized complete block design with 4 replications. Whole potato seed tubers were planted in the furrow at a distance of 50 cm between hills comprising 10 hills/furrow. The different fertilizer rates were applied fully as basal and thoroughly soil-incorporated to avoid direct contact between the planting and fertilizer materials.

The following data gathered were:

1. Plant height 30 and 45 days after emergences and a day before vine cutting.
2. Maturity a day before vine cutting. This was determined using the following:

Table 1

Ratings	Days	Description
5	70-89	Very early
3	90-109	Early
1	110 and above	Late

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3. Number of mainstems and lateral branches per hill taken during vine cutting.
4. Fresh and dry weights of haulms taken during vine cutting and after drying, respectively.
5. Ratings for thrips, aphids, leafhoppers, late blight, rhizoctonia, viruses and other pest 30 days after emergence and one week before vine cutting. The ratings use were as follows:

Table 2

Ratings	Description
5	Highly resistant
3	Resistant
1	Susceptible

6. Weight and number of marketable and non-marketable tubers during harvest.
7. Classification of harvested tubers into big, medium, small and marble sizes.
8. Computed yield (tons/ha).
9. Meteorological data as follows were taken throughout the conduct of the study.
 - a. Relative humidity
 - b. Rainfall
 - c. Temperature

3. Result and Discussion

Results showed that most of the varieties significantly outgrew Isola 30 DAE, at 45 DAE; that Ronea and Monza were significantly shorter than Cosima, Granola, Ilona, and Fina; and that Linda was the tallest before vine cutting. Berolina, Franza, Monza and Romanze significantly produced the highest number of mainstems while Greta, Ronea, Romanze, and Ilona, the highest number of lateral branches. As to maturity, most of the varieties were rated as early to late, Isola being the earliest. The fresh and dry weights of the haulms produced by Ronea and Romanze, respectively, were found to be significantly high. The reaction of the 15 varieties tested to insect pest did not vary statistically during the first observation, however, Isola was observed to be the most resistant variety one week before vine killing.

The highest response of the 15 varieties to varying levels of NPK showed that the unfertilized plots differed significantly from each of the increasing rates at any dates of observation. Likewise, application of NPK from 0-300 kg/ha failed to increase significantly the number of mainstems; however, a significant increase in the number of laterals produced were noted from 0-150 kg/ha. No further increase was noted up to the highest NPK levels. As to haulm weights, raising the rate of NPK from 0-210 kg/ha significantly increased the fresh weight and 0-150 kg/ha the dry weight. No significant differences on the reaction of the plants to insect pests infestation and affected by NPK levels were noted.

The interaction between variety and NPK levels showed that application of 300 kg/ha to Cosima significantly increased plant height over the control of 45 DAE. No significant interaction effects were obtained on the number of mainstems, lateral branches, days to maturity and reaction to insect pests. In terms of the dry weights of the haulm produced, Monza variety accumulated the highest dry matter yield when applied with 210 kg NPK/ha; Greta, 250 kg/ha.

3.1 Yield Parameters

The highest yielder, Red Pontiac, showed significant differences when compared to the rest of the varieties with the exception of Berolina. However, the highest number of tuber produced per hill was noted for Granola which significantly outnumbered Red Pontiac. In terms of the number of marketable tubers, Univita significantly outyielded most of the varieties tested with the exception of Greta and Red Pontiac. No significant differences were noted on the weight of non-marketable tubers and the weight of classified big I n marble tubers; however, significant differences were noted for the classified medium tubers.

Application of 300 kg NPK/ha significantly enhanced yield more than non-application and application of 150 NPK/ha but failed to significantly affect yield greater than application of 210 or 250 kg NPK/ha. On the number of marketable tuber yield per furrow, the application of 150 NPK/ha was sufficient to affect an increase on this measured parameter. In terms of the weight of marketable tuber, supplementing 300 kg NPK/ha significantly affected the heaviest yield but did not significantly increase the weight of non-marketable tubers. Likewise, no significant differences were noted on the weight of classified tubers except for medium tubers.

Red Pontiac registered the highest yield when applied 250 kg NPK/ha while Berolina variety did when applied 210 kg NPK/ha. In terms of weight of marketable tubers, Univita produced the heaviest weight when applied with 250-300 kg NPK/ha. Likewise, this variety, in addition to Ronea and Isola, had the heaviest medium classified tubers at the rate of 150 kg NPK/ha while Berolina and Granola at 210 kg NPK/ha, Romanze at 250 kg; Cosima, Omega and Fina at 300 kg NPK/ha.

4. Conclusion

Based on the results obtained from this study, it is concluded that Red Pontiac and Berolina are the only varieties that can be profitably produced under lowland conditions. Applications of 210-250 kg NPK/ha, would be the economical rates especially if the soil has high organic matter content.

5. References

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