Asian Journal of Agricultural and Horticultural Research

5(3): 22-31, 2020; Article no.AJAHR.55548
ISSN: 2581-4478

Effects of Potassium on the Growth, Yield and Physico-chemical Properties of Three Garden Pea (*Pisum sativum*) Varieties

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Authors' contributions

This work was carried out in collaboration among all authors. Author NA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors M. M. Ali and M. M. Akter managed the analyses of the study. Author MAK managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAHR/2020/v5i330053
Editor(s):
(1) Dr. Magdaléna Valšíkova, Slovak University of Agriculture, Slovakia.
Reviewers:
(1) Peter Hric, Slovak University of Agriculture, Slovakia.
(2) Jayath P. Kirthisinghe, University of Peradeniya Peradeniya, Sri Lanka.
(3) Iwona Rybakowska, Medical University of Gdansk, Poland.
Complete Peer review History: http://www.sdiarticle4.com/review-history/55548

Original Research Article

Received 10 January 2020
Accepted 18 March 2020
Published 26 March 2020

ABSTRACT

An experiment was conducted at the Horticulture Research Farm, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh during November 2015 to March 2016 to find out the effects of potassium on the growth, yield and physico-chemical properties of three garden pea (*Pisum sativum*) varieties. The experiment comprise three Garden pea varieties viz. V_1 = IPSA Motorshuti-3, V_2 = Broad Bean Master Piece and V_3 = BARI Motorshuti-1 and four levels of potassium viz. K_0 (Control), K_1 (25 kg ha^{-1}), K_2 (50 kg ha^{-1}) and K_3 and (75 kg ha^{-1}), respectively. The experiment was laid out in a randomized complete block design with three replications. The results of the experiment reviled that K nutrition and genotypic variation significantly ($p < 0.05$) determined the yield of the garden pea. Different levels of potassium had significant influences on

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almost all the parameters studied these three varieties. Maximum plant height (166.67 cm), branches plant^{-1} (7.00), pods plant^{-1} (39.00), sugar content (15.40%) was obtained from V_1K_2 (IPSA Motorshuti-3 with 50 kg K_2O ha^{-1}) treatment. Whereas highest pod length (8.533 cm), pod breadth (9.47 mm), number of seeds pod^{-1} (8.67), green seed weight (305.00 g), Magnesium content, (0.29%) was obtained under the treatment V_2K_2 (Broad Bean Masterpiece with 50 kg K_2O ha^{-1}). The maximum green pod yield (12.78 t ha^{-1}), calcium content (0. 20%), vitamin- A (1.03 mg/kg), was obtained from V_3K_2 (BARI Motorshuti -1 with 50 kg K_2O ha^{-1}).

Keywords: Garden pea; varieties; growth and yield; potassium.

1. INTRODUCTION

Garden pea *(Pisum sativum* L.) is a wide spread legume crop belonging to the family Fabaceae. It is a cold climate crop but also be grown in tropical countries during the winter [1]. It maintains soil fertility through biological nitrogen fixation along with symbiotic rhizobium prevalent in its root nodules [2]. Hence, it has been considered a valuable crop in the grass rotations and a biological source for nitrogen fixation in soil [3]. It is commonly used in human diet throughout the world and it is rich in protein (21-25%), carbohydrates, vitamins A and C, Ca, phosphorous and has high levels of amino acids: lysin and tryptophan [4]. Cultivation of this crop is highly profitable and attractive to farmers for its short duration. It takes 55 to 75 days from sowing for its green pods and 75 to 100 days for matured seeds. In Bangladesh the average yield of garden pea is very low (3.49 t/ha) compared to other countries [5]. Maynard et al. [6] reported that per hectare yield of pea can be increased by growing high yielding, pest and disease resistant varieties with proper fertilizer application [6].

The increasing cropping intensity to meet the demands for food for a swelling population has led to mining out the inherent plant nutrients from the crop fields thereby fertility status of the soils severely declined in Bangladesh over the years [7,8]. Especially the K content is low to very low in the soil of Bangladesh [9]. Whereas potassium plays a vital role in plant life for fat and potent synthesis. It helps the formation of mechanical tissues in legumes and also helps in the formation of grain. Potassium plays a vital role in photosynthesis by directly increases growth, leaf area index and stomata opening [10]. Evidently, management of K has become now very important in sustaining or increasing crop yield. Therefore, this study was under taken to see the effect of different level of potassium on the growth, yield and physico-chemical properties of three garden pea (*pisum sativum)* varieties.

2. MATERIALS AND METHODS

The experiment was set-up at the Research Farm of Horticulture Department, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh during November 2015 to March 2016. The experimental site was at 25°39′ N latitude and 88°41′ E longitude with an elevation of 37.58 meter above the sea level. The experimental field was a medium high having sandy loam soil with pH 6.20.The experiment comprise three garden pea varieties viz. V_1 = IPSA Motorshuti-3, V_2 = Broad Bean Master piece and V_3 = BARI Motorshuti-1 and four levels of potassium viz. K_0 (Control), K_1 (25 kg ha^{-1}), K_2 (50 kg ha^{-1}) and K_3 and (75 kg ha^{-1}), respectively. So the treatments combination was V_1K_0, V_1K_1, V_1K_2, V_1K_3, V_2K_0, V_2K_1, V_2K_2, V_2K_3, V_3K_0, V_3K_1, V_3K_2 and V_3K_3, respectively. The experiment was laid out in a randomized complete block design with three replications. Data were collected on different growth, yield and quality contributing characteristics i.e. plant height (cm), number of primary branches plant^{-1}, number of flowers plant^{-1} , number of pods plant^{-1} ,number of seeds pod^{-1},pod length (cm), pod breadth (mm),1000 seed weight (g), green pod yield (t ha^{-1}). Dried Seed were analyzed chemically for the following: dry matter, calcium, magnesium, potassium, vitamin C, vitamin A and total sugar content. Finally the data were analyzed by using MSTAT - C [11].

3. RESULTS AND DISCUSSION

3.1 Yield and Yield Attributing Characters

3.1.1 Plant height

The maximum plant height (161.50 cm) was observed in V_1 and the minimum plant height

(101.58 cm) from V_2 (Table 1). It was evident that plant height significantly differed from variety to variety. Hossain et al. [12] stated that IPSA motorshuti-3 produced them highest plant. Rahman [13] observed a quite high degree of variability in plant height among different pea varieties. In case of the different level of potassium plant height increased with the increasing rates of potassium. The tallest plant (135.55 cm) was obtained in K_3 (75 kg K_2O ha^{-1}) and the shortest plant (116.88 cm) was obtained in K_0 (Control) treatment (Table 2). Akhter et al. [14] reported that plant height increased with increasing rates of potassium. These results are in accordance with Leghari et al. [15], who found that increasing of potassium markedly increased the growth of peas. The interaction effect of different levels of potassium and varieties were statistically significant affect the plant height. The maximum plant height (166.67 cm) was obtained from the treatment of V_1K_3 treatment which was statistically similar with V_1K_3 while the minimum plant height (92.33 cm) was observed in treatment (Table 3).

3.1.2 Branches /plant

The highest number of primary branch $plant^{-1}$ (6.08) found V_1 whereas V_3 produced the lowest number of primary branch $plant^{-1}$ (5.33) (Table 1). Akhter [16] also noted differences in branch number in his study. In case of potassium the highest number of primary branches $plant^{-1}$ (6.67) was recorded from the treatment of K_2 and lowest (4.89) from K_0 treatment (Table 2). Patel et al. [17] stated that pea's cv. "Arbel" significantly increased in number of branches $plant^{-1}$ when applied @ 40 kg K_2O ha^{-1} [17]. However, the combined effect of variety and potassium on the number of primary branches $plant^{-1}$ was statistically non-significant (Table 3). Leghari et al. [15], showed their study that interaction effect of variety and potassium was insignificant.

3.1.3 Flowers /plant

It was observed that V_1 produced maximum (37.42) number of flowers $plant^{-1}$ and V_2 produced minimum (35.83) number of flowers $plant^{-1}$ (Table 1). It was evident that flowers / plant significantly differed from variety to variety. Hossain et al. [12] stated that IPSA motorshuti-3 produced highest number of flower $plant^{-1}$. In case of potassium the highest (38.33) number of flower $plant^{-1}$ was obtained in K_3 and the lowest (33.78) number of flower $plant^{-1}$ was obtained in K_0 (Control) treatment (Table 2).Interaction effect was statistically significant (1%). The maximum (39.33) number of flower $plant^{-1}$ was obtained from the treatment combination of V_1K_2 which was statistically similar with V_2K_2 while the minimum (30.00) number of flower $plant^{-1}$ was observed in V_3K_0 (Table 3).

3.1.4 Pods /plant

The number of pods $plant^{-1}$ ranged from 23.41 to 28.00. The highest number of pods $plant^{-1}$ (28.00) was recorded in V_1 and the lowest number of pods $plant^{-1}$ (23.41) was recorded in V_2 (Table 1). Alam et al. [3] obtained the highest number of pods $plant^{-1}$ in the variety. BARI Motorsuti-1 in a similar study. Such variation for number of pods per plant among various lentil varieties was also witnessed by early workers [18]. The effect of potassium is significantly differing for different treatment. The number of pods $plant^{-1}$ ranged from 22.56 to 27.22. The highest number of green pods $plant^{-1}$ (27.22) was recorded from the treatment of K_2 and the lowest number of pods $plant^{-1}$ (22.56) was found in the control treatment (Table 2). Akhter et al. [14] Stated that application of K_2O to the crop up to the dose of 100 kg ha^{-1} had significant positive effect on the number of pods $plant^{-1}$ .The number of pods $plant^{-1}$ ranged from 20.67 to 39.00. The maximum number of pods $plant^{-1}$ (39.00) was obtained under the treatment combination of V_1K_2 and the minimum number of pods $plant^{-1}$ (20.67) was obtained under the treatment combination of V_3K_0 treatment (Table 3).

3.1.5 Pod length (cm)

The length of pods ranged from 6.17 to 8.17 cm. The highest pod length (8.17cm) was measured in the variety V_2 whereas the lowest pod length (6.17 cm) measured in V_1 (Table 1). Hossain et al. [12] observed similar result in different types of pea. In case of potassium, the highest pod length (7.86 cm) was recorded from the treatment of K_2 @ 50 kg K ha^{-1} and the lowest pod length (6.88 cm) was found in the control treatment (0 kg K ha^{-1})(Table 2). Kanauija et al. [19] reported that increase in pod length of French bean with increasing K_2O up to 60 kg ha^{-1}.The combined effect of different variety and potassium on the pod length was significant (Table 3). The length of pods ranged from 5.50 cm to 8.53 cm. The highest pod length (8.53 cm) was recorded from the combined treatment of V_2K_2 (Broad Bean Masterpiece with 50 kg K ha^{-1}). The lowest pod length (5.50 cm) was found

in the combined treatment V_1K_1 (control treatment.)

3.1.6 Pod breadth

The pod breadth was significantly (1%) influenced by variety (Table 1). The widest pod (9.23 mm) was measured in the variety of V_3 and the lowest pod breadth (8.59 mm) was measured in V_1. Hossain et al. [12] observed similar result in different types of pea. In response to different level of potassium, the highest pod breadth (9.27 mm) was recorded from the treatment of K_2 @ 50 kg K_2O ha^{-1} and the lowest pod breadth (8.80 mm) was found in the K_3 treatment (75 kg K_2O ha^{-1}) (Table 2). Kanauija et al. [19] reported that increase in pod breadth of French bean with increasing K_20 up to 60 kg ha^{-1}. The combined effect of different variety and potassium on the pod breath was significant (1%) (Table 3).The length of pods ranged from 9.47 mm to 8.17 mm. The highest pod breadth (9.47 mm) was recorded from the combined treatment of V_2K_2 (Broad Bean Masterpiece with 50 kg K_2O ha^{-1}) which was statistically similar with V_3K_2. The lowest pod breadth (8.17 mm) was found in the combined treatment V_1K_3 (IPSA Motorshuti-3 with 75 kg K_2O ha^{-1} treatment.)

3.1.7 Number of seeds pod^{-1}

The highest number of seeds pod^{-1} (7.83) was recorded in V_2 and the lowest number of seeds pod^{-1} (5.83) was in V_1. Similar results were reported Silim et al. [20] by in field pea. In case of different levels of potassium application, the maximum number of seeds pod^{-1} (8.00) was found under the treatment K_2 and the lowest number of seed pod^{-1} (6.33) was obtained in the control treatment. Sinha et al. [21] also reported that seeds pod^{-1} increased with the application of 100 kg K_2O ha^{-1}. Combined effect of variety and potassium played a significant role on the number of seeds pod^{-1} (Table 3). Treatment consisting of variety combined with potassium at higher level was statistically similar and recorded higher number of seeds pod^{-1} compared to control. The maximum number of seeds pod^{-1} (8.67) was found in the treatment combination V_2K_2 (Broad Bean Masterpiece with 50 kg K_2O ha^{-1}) and the minimum number of seeds pod^{-1} (5.00) was found in the treatment combination V_1K_0.

3.1.8 1000- Seed weight (fresh mass)

The garden pea varieties differed widely in weight of 1000 (Fresh mass) seeds (Table 1). The green seed weight ranged from 265.75 to 302.92 g. The highest green seed weight (302.92 g) was recorded in V_3. The lowest green seed weight (265.75 g) was recorded in V_1. Alam et al. [3] obtained the highest 1000- seed weight (Fresh mass) in the variety BARI Motorsuti- 1 in a similar study. The effect of different levels of potassium on 1000 green seed weight was non-significant (Table 2). The highest weight of 1000 green seed were found (289.89) in the treatment of K_3 and lowest weight of 1000 green seed were found (285.56) in the treatment K_1. Amjad et al. [22] stated that 1000 green seed weight was highest in the application of 100 kg K_2O ha^{-1}. Different varieties in association with different levels of potassium increased 1000 green seed weight as compare to control. The maximum green seed weight (305.00 g) was obtained under the treatment combination of V_2K_2 treatment and the minimum seed weight (255.67 g) was obtained under the treatment combination of V_1K_1 (Table 3).

3.1.9 Green pod yield (t ha^{-1})

The green pod yield was significantly (1%) influenced by different varieties (Fig. 1). The green pod yield ranged from 11.73 to 7.74. The highest (11.73) pod yield was recorded in V_3. The lowest (7.74) pod yield was recorded in V_1. Alam et al. [3] obtained the highest green pod yield in the variety BARI Motorsuti -1. The green pod yield $hectare^{-1}$ was significantly (1%) influenced by different levels of potassium (Fig. 2). The highest (10.66 t ha^{-1}) green pod yield was obtained when the crop was fertilized with 50 kg K_2O ha^{-1}. The lowest (9.21 t ha^{-1}) green pod yield was found in control treatment where no potassium was applied. From these results it was found that potassium fertilizer increased vegetative growth as well as pod yield. All the treatments produced significantly higher pod yield over control treatment. Patel et al. (1998) stated that pea's cv. "Arbel" significantly increased in green pod yield when applied @ 40 kg K_2O ha^{-1} [17] .Variety and potassium interact significantly on yield (Fig. 3). Different varieties in association with different levels of potassium increased green pod yield compare to control. The maximum green pod yield (12.78 t ha^{-1}) was obtained under the treatment combination of V_3K_2 (BARI Motorshuti-1 with 50 kg K_2O ha^{-1}) and the minimum green pod yield (7.48 t ha^{-1}) was obtained under the treatment combination of V_1K_0 (IPSA- Motorshuti-3 with 0 kg K_2O ha^{-1}) which was statistically similar with V_1K_1, V_1K_2 and V_1K_3 treatment (Table 3).

Table 1. Effect of variety on yield and yield contributing parameters of garden pea

Treatments	Plant height (cm)	Branches / plant (no.)	Flowers / plant (no.)	Pods / plant (no)	Pod length (cm)	Pod breadth (mm)	Seeds / pod (no.)	1000 -(fresh) seed wt. (gm)
V_1	161.5 a	6.08 a	35.83 c	28.00 a	6.17 b	8.59 c	5.83 b	265.75 b
V_2	101.58 c	6.08 a	36.67 b	23.42 b	8.17 a	9.11 b	7.83 a	295.50 a
V_3	113 b	5.33 b	37.42 a	24.08 b	8.03 b	9.23 a	7.67 a	302.92 a
LSD	2.76	0.89	2.27	0.89	0.23	0.10	0.26	9.93
CV%	3.31	5.22	7.63	4.22	3.75	1.36	4.49	4.16

In a column, figure bearing same or no letter (S) do not differ significantly at 5% level of significant by DMRT

Table 2. Effect of potassium on yield and yield contributing parameters of garden pea

Treatments	Plant height (cm)	Branches /plant (no.)	Flowers / plant (no.)	Pods / plant (no)	Pod length (cm)	Pod breadth (mm)	Seeds / pod (no.)	1000 –fresh seed wt. (gm)
K_0	116.89 c	4.89 d	33.78 b	22.56 c	6.88 c	8.81 c	6.33 d	287.00
K_1	122.44 bc	6.11 b	36.22 ab	25.33 b	7.70 a	9.04 b	7.33 b	285.56
K_2	126.56 b	6.67 a	38.33 a	27.22 a	7.86 a	9.27 a	8.00 a	289.78
K_3	135.55 a	5.67 c	35.56 b	25.56 b	7.39 b	8.80 c	6.78 c	289.89
LSD	5.52	0.29	2.26	1.02	0.27	0.11	0.31	11.47
CV%	3.31	5.22	7.63	4.22	3.75	1.36	4.49	4.16

In a column, figure bearing same or no letter (S) do not differ significantly at 5% level of significant by DMRT.

Table 3. Interaction effect of Variety and Potassium on yield and yield contributing parameters of garden pea

Treatments	Plant height (cm)	Branches /plant (no.)	Flowers / plant (no.)	Pods / Plant (no)	Pod length (cm)	Pod breadth (mm)	Seeds /pod (no.)	1000 –fresh Seed wt. (gm)
V_1K_0	153.33 ab	5.00	37.00ab	25.67 bc	5.50 g	8.47f	5.00 g	285.33 ab
V_1K_1	160 a	6.33	38.00ab	27.00 ab	6.53 e	8.73e	6.00 f	255.67 c
V_1K_2	166.67 a	7.00	39.33a	39.00 a	6.63 e	9.00d	7.00 e	260.00 c
V_1K_3	166.00 a	6.00	37.00ab	29.33 a	6.00 f	8.17g	5.33 g	262.00 c
V_2K_0	92.33 c	5.00	34.33abc	21.33 de	7.77 cd	9.07cd	7.00 e	272.67 bc
V_2K_1	104 c	6.33	37.00ab	24.00b-d	8.37 ab	9.10b-d	8.00 bc	300.00 a
V_2K_2	107.67 c	7.00	39.00a	25.67 bc	8.53 a	9.33a	8.67 a	305.00 a
V_2K_3	102.33 c	6.00	36.33ab	22.67 c-e	8.00 bc	8.97d	7.67 cd	304.33 a

Treatments	Plant height (cm)	Branches /plant (no.)	Flowers / plant (no.)	Pods / Plant (no)	Pod length (cm)	Pod breadth (mm)	Seeds /pod (no.)	1000 –fresh Seed wt. (gm)
V_3K_0	105 c	4.67	30.00 c	20.67 e	7.37 d	8.90 de	7.00 e	303.00 a
V_3K_1	103.33 c	5.67	33.67 bc	25.00 bc	8.20 a-c	9.30 ab	8.00 bc	301.00 a
V_3K_2	105 c	6.00	36.67 ab	26.00 b	8.40 ab	9.47 a	8.33 ab	304.33 a
V_3K_3	138.33 c	5.00	33.33 bc	24.67 bc	8.17 a-c	9.27 abc	7.33 de	303.33 a
LSD	13.69	0.51	4.55	1.76	0.46	0.20	0.53	19.87
CV%	8.23	5.22	7.63	4.22	3.75	1.36	4.49	4.16

In a column, figure bearing same or no letter (S) do not differ significantly at 5% level of significant by DMRT

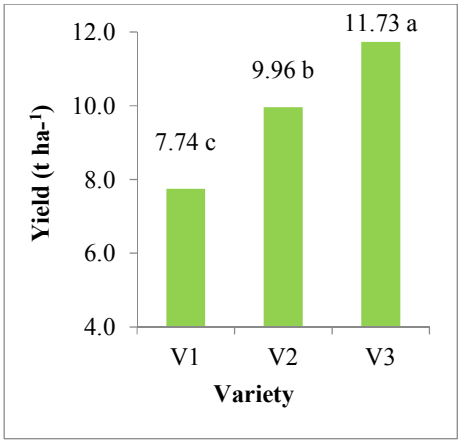

Fig. 1. Effect of Variety on the green pod yield (t ha^{-1})

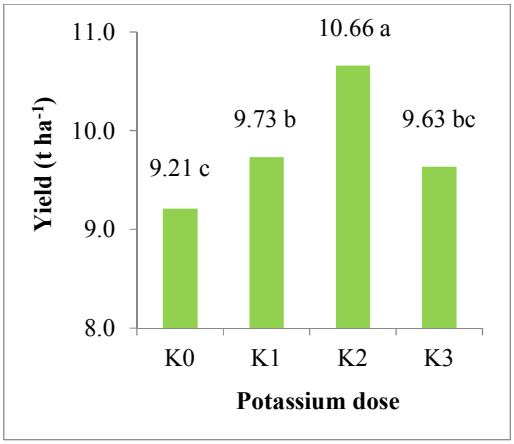

Fig. 2. Effect of potassium on green pod yield (t ha-1)

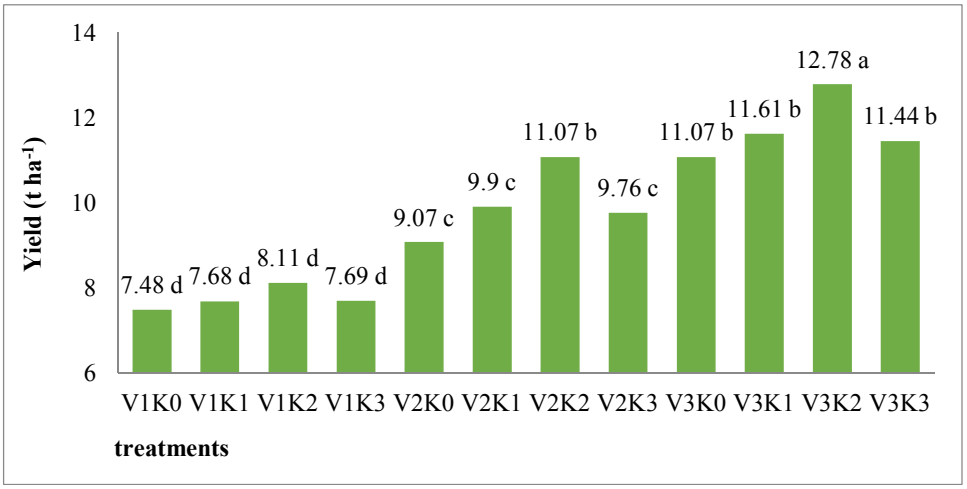

Fig. 3. Interaction effect of variety and potassium on the green pod yield (t ha^{-1})

Table 4. Effect of variety on physico-chemical properties of garden pea

Treatments	Dry matter (%)	Ca (%)	Mg (%)	K (%)	Vit-A (mg/kg)	Vit-C (mg/kg)	Total sugar (%)
V_1	35.05 a	0.18b	0.24 b	1.47 b	0.63 c	101.33b	14.14 b
V_2	29.53 b	0.18 b	0.29 a	1.69 a	0.67 b	124.67 a	15.30 a
V_3	30.80 b	0.19a	0.24 b	1.47 b	0.83 a	75.76c	15.40 a
LSD	2.01	0.009	0.008	0.181	0.02	5.39	0.182
CV%	7.65	3.71	3.77	3.11	2.31	4.47	3.58

In a column, figure bearing same or no letter (S) do not differ significantly at 5% level of significant by DMRT

3.2 Physico-Chemical Properties

Different Physico-chemical properties, of garden pea was significantly (1%) influenced by variety (Table 4). The highest amount of dry matter (35.05%) content was found in V_1, whereas the maximum Potassium (1.69), Magnesium (0.29) and Vit-C (124.67) found in V_2 but the highest amount Calcium (124.67), Vit.-A (0.83) and total sugar (15.40) were found in V_3.In case of different levels of potassium application, the highest dry matter content of pea (33.51%) was

Table 5. Effect of potassium on physico- chemical properties of garden pea

Treatments	Dry Matter (%)	Ca (%)	Mg (%)	K (%)	Vit-A (mg/kg)	Vit-C (mg/kg)	Total Sugar (%)
K_0	30.73 b	0.19b	0.25 b	1.44 b	0.62 d	101.33	14.14 c
K_1	33.51 a	0.18c	0.26 a	1.58 a	0.75 b	100.33	15.30 a
K_2	32.40 ab	0.20a	0.26 a	1.58 a	0.80 a	101.33	15.40 a
K_3	30.55 b	0.16 d	0.26 a	1.44 b	0.69 c	100.33	
LSD	2.32	0.001	0.001	0.11	0.03	5.52	0.182
CV%	7.65	3.71	3.77	3.11	2.31	3.31	3.58

In a column, figure bearing same or no letter (S) do not differ significantly at 5% level of significant by DMRT

Table 6. Interaction effect of variety and potassium on physico-chemical properties of garden pea

Treatments	Dry Matter (%)	Ca (%)	Mg (%)	K (%)	Vit-A (mg/kg)	Vit-C (mg/kg)	Total Sugar (%)
V_1K_0	33.30 a-c	0.20 a	0.24 c	1.50 b	0.58 g	101.33b	14.98 c
V_1K_1	37.30 a	0.16 c	0.24 c	1.50 b	0.64 e	101.33b	15.30 a
V_1K_2	36.73 ab	0.20a	0.24 c	1.50 b	0.65 e	101.33b	15.40 a
V_1K_3	32.90 bc	0.16 c	0.24 c	1.39 b	0.64 e	101.33b	15.23 a
V_2K_0	29.76 cd	0.17 b	0.27b	1.41 b	0.62 f	124.67a	13.59 f
V_2K_1	31.80 cd	0.20 a	0.29 a	1.75 a	0.68 d	124.67a	14.57 d
V_2K_2	29.37 cd	0.20 a	0.29 a	1.75 a	0.69 d	124.67a	14.98 c
V_2K_3	27.20 b	0.16 c	0.29 a	1.52 b	0.69 d	124.67a	14.19 e
V_3K_0	29.13 cd	0.20a	0.24 c	1.48 b	0.65 e	75.00c	14.98 c
V_3K_1	31.42 cd	0.20 a	0.24 c	1.48 b	0.92 b	75.00c	14.91 b
V_3K_2	31.10 cd	0.20 a	0.24 c	1.48 b	1.03 a	78.00c	15.41 a
V_3K_3	31.56 cd	0.16 c	0.24 c	1.42 b	0.74 c	75.00c	14.10 e
LSD	4.03	0.01	0.166	0.1816	0.524	5.52	0.182
CV%	7.65	3.71	3.77	3.11	2.31	3.31	3.58

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recorded from the treatment of K_1 whereas the Calcium (0.20),Potassium (1.58), Magnesium (0.26) Vit.-A (0.80) , Vit-C (101.33) and total sugar content(15.40) found in higher in Treatment K_2 (Table 5).The combined effect of variety and potassium levels on the dry matter content of pea was statistically significant, the maximum dry matter content of pea (37.30%) was obtained in treatments combination of V_1K_1 and the minimum dry matter content of pea (27.20%) was obtained under the treatment combination of V_2K_3(Table 6). The maximum Calcium (0.20), Potassium (1.75), Magnesium (0.29) and Vit-C (124.67) was found from V_2K_2 whereas Vit.- A (1.03) and total Sugar content (15.41) in V_3K_2 treatment combination (Table 6).

4. CONCLUSION

The positive response between variety and potassium application on yield components and physico-chemical properties of garden pea was noticed in this study. However the garden pea genotype V_3 (BARI motorsuti -1) was more responsive to K_2 (50 kg ha^{-1}) level of potassium in respect of different growth, yield attributing and physico-chemical parameters. So it can be concluded that variety BARI Motorsuti-1 with potassium at the rate of 50 kg ha^{-1} is a promising practice for the highest yield of garden pea.

ACKNOWLEDGEMENT

This work was supported by funds of The Ministry of Science and Technology, under special allocation for Science and Technology, Government of the People's Republic of Bangladesh.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Received: 06 November 2018
Accepted: 27 November 2018
Published: 29 November 2018.
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Peer-review history:
The peer review history for this paper can be accessed here:
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