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# Evaluation of Buck Wheat (*Fragrarium esculentum*) Genotypes under High Altitude Cold Arid Regions of Kargil (J&K)

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**ABSTRACT**

*A field experiment was conducted with three genotypes of Buckwheat-Himachal Local, Gurez Local and Kargil Local in a randomized block design at Mountain Agriculture Research and Extension Station Kargil. The results revealed that mean number of internodes (18), number of leaves (40), leaf length (4.3 cm), leaf width (4 cm), number of branches (18), 100-seed weight (4.2 g) and seed yield (9.9 g) was higher in Himachal Local as compared to all other genotypes. Further it was found that Himachal Local took minimum number of days (82) to maturity and thus better suited for cold arid conditions with short growing season.*

***Key words:*** *Buckwheat, Genotypes, Cold Arid, Seed Yield*

## INTRODUCTION

The Ladakh region is one of the most elevated (2900 to 5900 masl) and coldest region (-30 $^0$C to -70 $^0$C) of the earth and lies between 310 44' 57'' to 320 59' 57" N latitude and 760 46' 29'' to 800 41' 34'' E longitude. The buckwheat growing areas are Skurbuchan, Achinathang, Domkhar, Dha-Beema, Bogdang and Turtuk in Leh district and nearly all villages in Kargil district, which are low lying areas and located near line of control which remain land locked for more than six months in a year. The villages in Leh district are located around the famous river Indus. Similarly, the villages of Kargil district are inhabited near the Indus and Suru River[1].

Buckwheat is the most important livelihood supporting, multi-purpose and nutritious crop of the tribeals living in the Cold arid conditions of Kashmir valley mostly in district Kargil[15]. Buckwheat contains some nutritionally beneficial components at high levels and may have many characteristics as a functional food. *Fagopyrum esculentum* and *F. tataricum* are the two species cultivated in the Himalayas. Buckwheat breeding is quite complicated because of complicated system of self incompatibility[13]. This is a possible explanation for relatively slow progress in achievements of higher yield in buckwheat, ultimately resulting to its declining cultivation and production.

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In some of the areas, it has been completely replaced due to change in land use pattern for quick economic gains. Due to the low yielding potential output and cultivation constraints, the crop is at the verge of extinction though it is of high medicinal and nutritive value[9]. The crop is economically important primarily due to its edible protein and carbohydrate rich grains, hardiness of plants, short growth span and foliage being used as a green vegetable. The grain of buckwheat is a dry fruit-, structurally and chemically the endosperm resembles cereals as it has a nonstarchy aleurone layer and a starchy endosperm. The crop is economically important primarily due to its edible protein and carbohydrate rich grains, hardiness of plants, short growth span and foliage being used as a green vegetable. Buckwheat is also used for livestock and poultry feed, buckwheat honey and as cover for wild life. Buckwheat noodles are particularly used in Japan. Buckwheat protein quality is high due to high concentration of most essential aminoacids especially lysine, tryptophan and threonine; besides buckwheat contains a high content of albumins + globulins and a low content of prolamins. However, due to a high content of crude fibre and tannin the true digestibility is below 80%. Buckwheat foliage is one of the chief sources of rutin (quercetin 3- rutinoside). Rutin is used in medicine in the treatment of increased capillary fragility with associated hypertension; protects against the harmful effects of X-rays; counteracts the effects of drugs such as salicylates, thiocynates and sulphadiazines which cause weakening of capillarie's. Rutin can act as antioxidant of ascorbic acid that can trigger diabetes, cardiovascular diseases besides hypertension. The use of pure rutin from buckwheat is cosidered safe and harmless[2,3]. However, there is a danger of the disease "fagopyrism" when grains are consumed in large amounts. The pigment which causes the disorder is present only in theflowers and hulls but not in leaves, stem or flour[4]. The literature on buckwheat has been extensively reviewed The wealth of India 1956[4,7,10,12]. Buckwheats In Kashmir The first descriptive record of buckwheat cultivation in Kashmir is found in the writings of nineteenth century[6]. According to Lawrence the "trumba" or buckwheat *(Fagopyrum esculentum) is a* most useful plant, as it can be sown late in almost any soil, and when the cultivator sees that there is no hope of water coming to his rice fields he will at once sow the sweet trumba. The sweet trumba *(F. esculentum)* often grown as a substitute for rice has white pinkish flowers can be sown upto middle of July and the bitter trumba *(F. tataricum)* in the higher villages fonns the only food grain of the people eaten as bread or porridge[6]. However, with time there seems to be a gradual decline in the interest of the people to grow buckwheat because of the agricultural awareness about other crops including the irrigation facilities. The buckwheat crop in Kashmir is thus regarded to be the crop of the poor. So the domestication of buckwheat in Kashmir is still in the primitive stages and the crop has not been subjected to intensive experimentation. The research interest on buckwheat in Kashmir started quite recently. Four species of Fagopyrum viz common buckwheat (F.esculentum Moench), coarse buckwheat (F.sagittatum Gilib.) , Kashmir buckwheat *(F. kashmirianum* Munshi) and tartary buckwheat (F. tataricum Gaenn.) have been reported in populations from various high altitude areas of Kashmir[11,14], The populations abound either in *F. esculentum* or *F. sagittatum.* The perennial species *F. cymosum* Meissn. grows wild and can be propagated through rhizomes. Munshi[8] believes that *F. kashmirianum is* allied to *F. tataricum.* The four cultivated species are diploid with 2n = 16 and the wild growing *F. cymosum* is a tetraploid with 2n = 32[5].

Keeping in a view the above facts, the present investigation was carried out to find out the most suitable genotype for cold arid conditions of Kargil.

## MATERIAL AND METHODS

Site and Soil: The experiment was conducted at Mountain Agriculture Research & Extension station, SKUAST-K. The soil of the experimental field was sandy in texture with low N, P and K status.

Experimental setup: The experiment was conducted during 2017 with three genotypes of buckwheat-Himachal Local, Gurez Local and Kargil Local in a completely randomized block design with three replications. The sowing was done on 5th August, 2017.

## RESULTS AND DISCUSSION

Growth attributes: The plant height varied widely among the different genotypes. The highest plant height was recorded in Gurez Local as compared to other genotypes. However, the number of internodes (40) and number of leaves (40), leaf length (4.3 cm) and leaf width (4 cm) was higher in Himachal Local as compared to other genotypes.

**Yield attributes:** The number of branches (18) and 100-seed weight (4.2 g) was higher in Himachal Local as compared to other genotypes. The number of branches and 100-seed weight was higher by 80 & 157 and 8 & 24 % higher in Himachal Local as compared to Gurez Local and Kargil Local, respectively.

**Phenology:** Himachal Local took the minimum number of days to flowering (35) and maturity (82) as compared to other genotypes. The characteristic of attaining early phenological stages is considered as a valuable attribute for higher yield under the short growing season of Kargil.

**Seed yield:** The seed yield was higher in Himachal Local by 83 & 125 % as compared to Gurez Local and Kargil Local, respectively. The seed yield may be higher in Himachal Local due to higher growth and yield attributes in combination to quicker attainment of phenological stages (Table 1) as compared to other genotypes.

## CONCLUSION

It can be concluded that Himachal Local is the best suited genotype for Cold arid conditions of Kargil with short growing season because of its higher growth and yield attributes together with higher seed yield.

**Further Implications:**

The development of suitable buckwheat varieties however needs further evaluation for higher seed yield and nutritional quality across diverse agro-ecological situations through participatory breeding approaches.

**Table 1: Growth and Seed yield in different genotypes of Buck Wheat**

| Genotypes | Plant height (cm) | Number of branches | Number of internodes | Number of leaves | Leaf width (cm) | Leaf length (cm) | Days to flowering | Days to maturity | 100-Seed weight (g) | Seed yield per plant (g) |
|---|---|---|---|---|---|---|---|---|---|---|
| HIMACHAL LOCAL | 45 | 18 | 18 | 40 | 4 | 4.3 | 35 | 82 | 4.2 | 9.9 |
| GUREZ LOCAL | 60 | 10 | 9 | 18 | 5 | 3.9 | 42 | 111 | 3.9 | 5.4 |
| KARGIL LOCAL | 32 | 7 | 11 | 31 | 4.5 | 3.2 | 53 | 96 | 3.4 | 4..4 |
| **Mean** | **45.7** | **11.7** | **12.7** | **29.6** | **4.5** | **3.8** | **43.3** | **96.3** | **3.8** | **6.6** |

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