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# Evaluation of buckwheat (*Fagopyrum esculentum* L.) genotype on the basis of quality parameters

**Shivani Dubey, Arun Kumar Chaurasia, Pradeep K shukla, Anchal Kumari and Poonam Dilip Patil**

**Abstract**
Buckwheat is annual plant from the Polygonaceae family. It is very important food in human diet, especially in countries like Chins & Russia, with special emphasis on safe food produced in organic production. The grain is similar to corn bread wheat regarding nutrients and Nutritive value. The main objective of this to evaluate the buckwheat genotype on the basis of quality parameter. Eleven genotypes were purchased from ICAR-NBPGR, rest two were purchased from CSKHPK Himachal Pradesh and ICAR-NOFRI, Sikkim, Respectively. The genotypes were germinated in Genetics and Plant Breeding laboratory of SHUATS, Naini, Prayagraj, Uttar Pradesh. Two observations were taken on the 4th and 7th day respectively. Among all the genotypes IC-16553 was considered as best genotype in parameters like (germination %, speed of germination, root length, shoot length, seedling length, dry weight, fresh weight, vigour index Ⅰ & vigour index Ⅱ) of seed quantity.

**Keywords:** Buckwheat, genotypes, polygonaceae family, safe food produce, seed quality parameters

## Introduction
Buckwheat is a plant of Polygonaceae family, from the alternative grain group, which originated from the wide areas of Central Asia. By neglected alternative grains introduction in organic production, among which spelt and buckwheat are the most important, biodiversity increases, weeds, pests and diseases are reduced compared with the monoculture. It is a very important food in the human diet, especially in countries with special emphasis on safe food, produced in organic production. The grain is similar to corn bread wheat regarding nutrients and nutritive value. The weight of 1000 grains is 24-30 g (Popovic *et al*., 2013) and test weight 50-70 g. The buckwheat crop is suitable pasture for the bees, and the yields vary from 120 up to 300kg of honey per hectare. Buckwheat flowers are rich in nectar and flowering for a long time. It is a plant with good environmental conditions, favorable regard previous crop and does not require chemicals for protection. Buckwheat cultivation in North-Western Himalayan region is more common as a pure crop is differ to mixed cropping which is generally practiced for other crops. Buckwheat is mostly grown in J&K, Himachal Pradesh and Uttarakhand and in some Northern state of India i.e, Sikkim, Assam, Arunachal Pradesh, Nagaland, Manipur also cultivated in Nilgiri and Palni Hills in Southern India. Under the all India coordinated research network project systematic research work on pseudocereal has started. Now, new name of the project is the All India coordinator research network project.

Buckwheat functions as main food in outer countries like, China, Japan and Taiwan mostly used in making noodles, it has some phenolic compounds and antioxidant activity. Buckwheat has high rutin as comparison to mostly fruit, vegetables and grain crops. The rutin is present in the form of a quercetin-3-rutinoside, antioxidants and anti-inflammatory and some of the physiological properties. Therefore, buckwheat is used as supplements of various food products and widen its consumption.

The wholegrain contains 10% moisture content, 11.2% protein, 2.4% fat, 10.7% fiber, 64% N-free extract, 1.7% ash. Buckwheat flour light contains 12.1% moisture content, 7.8% protein, 1.5% fat, 0.7% fiber, 76.7% N-free extract, 1.2% Ash. Buckwheat flour dark contains 11.7% moisture content, 15% protein, 2.8% fat, 1.1% fiber, 67.7% N-free extract, 1.7% ash. Groats contain 10.6% moisture content, Hulls contain 8.0% moisture content, 4.5% protein, 0.9% fat. It provides advantageous effects on health and put a stop in oxidation of food during processing. Bread is consumed globally and is made mainly from wheat flour, water, salt and yeast. Many food ingredients such as yam, shiitake stipe and silver ear, other than those mentioned above, have been included in bread formulation to substitute part of the wheat flour to increase its diversity, nutritional value and product appeal.

Bread quality and antioxidant properties of buckwheat bread have studied. In addition, the volatile compounds and non-volatile taste components of buckwheat bread have been determined. The grains of buckwheat is rich in microelements, like: Zinc, Copper, selenium, Manganese, and some macro elements like: potassium, Sodium (Na), calcium (Ca), Magnesium (Mg). The grain contains approx 80% of unsaturated fatty acids and more than 40% of constituted by poly unsaturated fatty acid (PUFA) (Kekoskova & Mrazova 2005) [3]. Besides, it's grains are good source of Total dietary fiber (TDF), Soluble dietary fiber (SDF), and also helps in Diabetes and Obesity prevention.

## Materials and Methods

The experiment was conducted in seed testing laboratory of Genetics and plant breeding, SHUATS, (Naini Agricultural Institute), Prayagraj (U.P.). Current experiment conducted using complete Randomized Design with four replications. In this present investigation thirteen genotypes of buckwheat are used**.** Eleven were purchased from ICAR-NBPGR, rest two from CSKHPK Himachal Pradesh and ICAR-NOFRI respectively, Sown them in between paper method in favorable condition. After the 4th day of germination first count was taken and on the 7th day final count was taken.

## Result and Discussion

Present investigation entitled "Evaluation of buckwheat (*Fagopyrum esculentum* L.) Genotype on the bases of quality parameter was carried in the seed testing laboratory of (SHUATS) Sam Higginbottom University of Agriculture Technology and Sciences. Prayagraj, Uttar Pradesh.

**Table 1:** (Mean performance table for seed quality parameters)

| S. No. | Genotype Code | Genotype | Germination% | Root length(cm) | Shoot Length (cm) | Seedling length (cm) | Fresh weight (g) | Dry weight(g) | Vigour Index I | Vigour Index II |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | G1 | IC-16559 | 91.75 | 13.47 | 10.85 | 25.4 | 1.52 | 0.07 | 2330.46 | 6.87 |
| 2. | G2 | Meethay | 89.75 | 12.21 | 10.06 | 22.61 | 1.27 | 0.06 | 2029.96 | 5.61 |
| 3. | G3 | Teethay | 88 | 12.95 | 10.75 | 23.67 | 1.22 | 0.08 | 2082.67 | 7.25 |
| 4. | G4 | EC- 2018742 | 83 | 12.21 | 11.33 | 21.87 | 1.25 | 0.08 | 1816.08 | 7.27 |
| 5. | G5 | IC-13144 | 93.5 | 16.73 | 11.06 | 27.3 | 1.42 | 0.08 | 2551.55 | 7.71 |
| 6. | G6 | IC-13412 | 87.5 | 12.11 | 10.23 | 22.32 | 1.07 | 0.07 | 1953.12 | 6.34 |
| 7. | G7 | IC-13413 | 86.5 | 12.52 | 9.12 | 21.75 | 1.20 | 0.07 | 1882.76 | 6.05 |
| 8. | G8 | IC-16551 | 93.75 | 12.58 | 9.38 | 22.73 | 1.07 | 0.08 | 2130.81 | 7.73 |
| 9. | G9 | IC-16553 | 94 | 13.45 | 10.4 | 24.1 | 1.35 | 0.07 | 2264.77 | 7.28 |
| 10. | G10 | Ogla Local | 93.5 | 11.16 | 10.47 | 22.73 | 1.07 | 0.08 | 2128.93 | 7.72 |
| 11. | G11 | IC-18881 | 92 | 13.17 | 13.46 | 26.63 | 2.10 | 0.08 | 2451.31 | 7.81 |
| 12. | G12 | IC-22426 | 88.5 | 10.67 | 8.47 | 19.07 | 1.07 | 0.07 | 1690.37 | 6.83 |
| 13. | G13 | IC-24297 | 92.25 | 15.21 | 10.37 | 25.33 | 1.22 | 0.06 | 2334.41 | 5.76 |
| | SEm(+) | | 3.06 | 10.17 | 5.82 | 20.09 | 0.081 | 0 | 259136.9 | 2.41 |
| | C.D at5% | | 1.71 | 1.24 | 1.27 | 2.53 | 0.23 | 0.01 | 254.1 | 0.88 |

## Summary

All the characters of 13 genotypes were varied significantly during the present investigation.

The results of present investigation were summarized and concluded as of below.

### Seed quality parameters

Germination % was found to be highest in the genotype IC-16553 (94%) among all the genotypes and the lowest was recorded in the genotype EC-2018742 (83%). Maximum total root length was recorded by the genotype IC-13144 (16.73 cm) and lowest total root length was recorded by the genotype IC-22426 (10.67 cm). Maximum total shoot length was recorded by the genotype IC-18881 (13.46 cm) and lowest total shoot length was recorded by the genotype IC-22426 (8.47 cm). Total seedling length varied significantly among the genotypes and the maximum was recorded in the genotype IC-13144 (27.3 cm) while the minimum was found in the genotype IC-22426 (19.07 cm). Maximum fresh weight was recorded in the genotype IC-18881(2.10 g) while minimum was recorded in the genotype IC-13412 (1.07 g), Ogla Local (1.07 g), IC-16551 (1.07 g). Maximum dry weight was recorded in the genotype Teethay, EC-2018742, IC-13144, IC-16551, Ogla Local, IC-18881 (0.08 g). While minimum was recorded in the genotype Meethay, IC-24297 (0.06 g). Seed vigour index-I recorded was found to be maximum in the genotype IC-13144 (2551.55) while minimum was found in the genotype IC-22426 (1690.37). Seed vigour index-II recorded among the genotypes varied significantly and the maximum vigour index –II was recorded in the genotype IC-18881 (7.81) while the minimum was recorded in the genotype Meethay (5.61).

## Conclusion

The present investigation concluded that the 13 genotypes of Buckwheat, IC-16553 has been identify as the best genotype for seed quality parameters *viz*, germination %, speed of germination, Root length, Shoot length, Seedling length, Dry Weight, fresh weight, vigour index I and vigour index II.

### Future line of work

Further investigation needs to conduct for the confirmation of the promising genotypes for Prayagraj region. The genotypes IC-16553 and IC-18881 were found most promising for commercial cultivation under agro climatic conditions of Prayagraj region and hence it can be useful for further crop improvement programmes.

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