

RESEARCH ARTICLE

Growth assessment of buckwheat (*Fagopyrum* species) - A source of fodder

■ SHAYAT KUMAR

SUMMARY

A field experiment was conducted with five local species of buckwheat to study the diversity pattern based on quantitative and qualitative characters during the November 2011 to April 2012. There exists significant variation among the buckwheat genotypes for all the parameters studied. Days to 50 per cent flowering, plant height, number of leaves, fresh weight of leaves, fresh weight of stem were found to contribute maximum towards genetic divergence among the buckwheat genotypes. Considering diversity pattern and other agronomic performance, *F. tataricum* out yielded other three species under the field conditions.

Key Words : Buckwheat (*F. esculentum*, *F. kashmirianum*, *F. esculentum* and *F. sagittatum*.), Fodder, Qualitative traits, Quantitative traits, Yield

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Buckwheat, which is considered to be a underutilized crop, is of significant economic importance in several countries of the world although it is produced in many countries and on every continent. The two species which are of the highest economic importance are *Fagopyrum esculentum*, generally called common buckwheat, which is the main species under cultivation and production for international trade and *F. tataricum*, or tartary buckwheat which is produced in many areas of the world but is second in economic importance. Although the genus *Fagopyrum* contains at least eighteen species of buckwheat only two are utilized as food or feed and one other is used as livestock fodder. However, in comparison to the cereal

crops, the seed yield of *F. esculentum* is often relatively low and unstable. Tartary buckwheat, on the other hand, has a tightly adhering husk that is hard to remove and contains a bitter component that limits its use as a food although there has been recent attention being given this species due to its having compounds that are beneficial to health. Wild buckwheat (*F. cymosum*) found as a diploid in China and mainly found as a tetraploid in other countries, is also utilized in some areas as a green vegetable or as cattle forage.

But unfortunately research information especially for genetic improvement of this crop is almost unavailable in north west Himalayas particularly Jammu & Kashmir. The genetic diversity within the available germplasm is primary requisite for designing of any breeding program. This helps to choose desirable parents for establishing new breeding population. Better knowledge on genetic diversity or genetic similarity could help to sustain long

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term selection gain (Chowdhary *et al.*, 2002). Knowledge of genetic diversity among existing cultivars/species of any crop is essential for long term success of breeding programme and maximizes the exploitation of the germplasm resources (Belaj *et al.*, 2002 and Rasul and Okubo, 2002).

Hilly areas of some of the states like Jammu and Kashmir, Himachal Pradesh and Uttarakhand are monocrop regions since severe winter does not permit a second crop. All the cultivable area is sown under cereal crops and the cultivation of fodder is the last priority of the farmers. Of late, efforts have been made to popularise the cultivation of winter oat, barley, triticale etc during winter for fodder. These potential fodder crops take a long time to mature (sown in Sept.-Oct. provide fodder in March-April) which is an impediment in popularisation of their cultivation. Buckwheat, introduced in Kashmir during 1200 A.D. (Gohil, 1983; Ratan and Kothiyal, 2011) for grain only is an early maturing crop and cultivated in the Ladakh and Gurez regions of Jammu & Kashmir state. In Kargil region of Ladakh, buckwheat is sown during August-Sept. (after the harvest of barley and wheat) and is harvested for grains in the month of October but in the event of the grains not maturing due to cold the crop is harvested for fodder. To ascertain the possibility of introducing the cultivation of buckwheat as an early maturing fodder crop in the scheme of the cropping pattern of the hilly regions of Kashmir, four species of *Fagopyrum* (Buckwheat) were evaluated with regard to various fodder attributes.

MATERIAL AND METHODS

The assessment was undertaken by sowing the seeds of *Fagopyrum kashmirianum*, *Fagopyrum esculentum*, *Fagopyrum sagittatum* and *Fagopyrum tataricum* (Buckwheat) in experimental fields in district Anantnag (Kashmir) during November, 2011 to April, 2012. The experiments were laid out in a Randomized

Complete Block Design (RCBD) with five replications. The unit plot size measuring 2m x 2 m consisting of five rows. Row to row distance was 25cm. Organic manure was mixed with soil during final land preparation and basal fertilizer dose 20 kg N/h was applied. Intercultural operations such as weeding and thinning were done as and when necessary during the growing period for proper growth and development of the plants. No irrigation was provided. Ten plants were selected at random from each plot for recording data. The data were recorded at the time of 50 per cent flowering stage and the fodder attributes were recorded from ten randomly selected plants from each collection. Mean values of the observations recorded were analysed by analysis of variance (ANOVA). Fresh weight of the fodder yielded was recorded at the time of harvesting. Dry matter yields were recorded after sun drying the samples.

RESULTS AND DISCUSSION

In the present study, significant differences were observed between *F. tataricum* and the rest of the three species in respect of the days to 50 per cent flowering (Table 1). *F. tataricum*, have taken maximum number of days (52 days) to 50 per cent flowering as compared to other species (33 days in *F. Kashmirianum*, 38 days in *F. esculentum* and 49 days in *F. Sagittatum*). However, as far as the average number of leaves, leaf fresh weight and stem fresh weight is concern *F. tataricum* showed maximum growth as compared to *F. kashmirianum*, *F. esculentum* and *F. sagittatum*. The observed values clearly indicate, that, all the four species under study manifest significant variations with regard to the various fodder attributes. Of all the species under assessment, *F. tataricum* recorded the highest values for fresh and dry leaf weight (18.6 and 6.3g/plant), fresh and dry stem weight (24.3 and 14.6 g/plant), fresh fodder yield (34.3 t/ha) whereas *F. sagittatum* showed minimum mean values for these attributes.

Table 1 : Fodder attributes of *Fagopyrum* species growing in fields of Anantnag district of Jammu & Kashmir

Species	Days taken to 50% flowering	No. of leaves /plant (mean±s.d.)	Height of plant (cm) (mean±s.d.)	Leaf wt./plant (g) (mean±s.d.)		Stem wt./plant(g) (mean±s.d.)		Fresh fodder yield (t/h)
				Fresh	Dry	Fresh	Dry	
Kashmirianum	33±2.3 ^a	69.4±2.1 ^b	59.4±5.6 ^b	9.2± 1.2 ^b	5.4±0.5 ^b	12.6± 2.3 ^b	6.4±1.2 ^b	17.4±2.1 ^b
Esculentum	38±2.1 ^a	60.8±2.6 ^{ab}	86.0±6.7 ^c	9.8± 1.2 ^b	4.6±0.4 ^b	12.4±1.9 ^b	7.8±1.5 ^b	17.7±2.2 ^b
Sagittatum	49±2.2 ^b	55.2±2.5 ^a	44.6±6.5 ^a	5.8±1.5 ^a	2.5±0.4 ^a	7.2±2.5 ^a	3.8±1.4 ^a	10.4±1.6 ^a
Tataricum	52±2.1 ^b	98.3±3.1 ^c	36.8±7.2 ^a	18.6± 1.3 ^c	6.3±0.9 ^c	24.3±2.4 ^c	14.6±1.4 ^c	34.3±1.3 ^c
Mean values	43±2.2	70.9±2.7	56.7±7.7	10.8±1.3	4.7±0.6	14.1±2.3	8.1±1.4	19.9±1.7

Means are significantly different from each other at 5 per cent level by analysis of variance (ANOVA) in each column

Similar studies were also reported by Tahir and Farooq, 1983 and 1987. The height of the plant and number of leaves per plant were neither correlated nor showed any significant correlation with fodder yield. Maximum average height (86.0cm) was observed in *F. esculentum* whereas *F. tataricum* showed minimum average height (36.8cm). As far as the number of leaves per plant is concerned *F. tataricum* had maximum number of leaves/plant (98.3) whereas the other species had less number of leaves (*F. kashmirianum*: 69.4; *F. esculentum*: 60.8 and *F. sagittatum* : 55.2). Taking in the account the fodder yield of *F. tataricum*, when a comparison was made of the net gain in four species of buckwheat, *F. tataricum* not only the highest fodder yield (34.3 t/ha) but also the number of latter branches at harvest.

Thus, the farming activity in Kashmir valley is at a very low-key from the mid of February to May, only, that, the lands are being prepared for cultivation of paddy which commences in the month of June. This relatively inactive farming period, when the cultivable land is idle could well be utilized for the cultivation of *F. tataricum* to supplement to the fodder needs of the region. As it is an early maturing crop plant (50% flowering takes place in only 52 days) and the green fodder yield is sufficiently high (34.3 t/ha), its cultivation in the intervening period will not hamper the regular

farming in any way.

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