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Effect of panchgavya on quality parameters of mungbean [*Vigna radiata* (L.) Wilczek]

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Abstract
A field experiment was conducted at Research Farm of Suresh Gyan Vihar University, Jaipur (Rajasthan) during *kharif* 2023 on sandy loam soil consisting two factor of panchgavya *i.e.* application doses (control, 2%, 4%, 6%, 8% and 10%) and application stages (branching, flowering and branching+flowering) which were laid out in a split plot design. In main plot application doses was taken and in sub plot application stages was taken. The mungbean variety "RMG-492" was used for experiment. Results clearly showed that application of panchgavya @ 4% significantly increased quality of mungbean *i.e.* nitrogen, phosphorus, potassium content in seed and straw and their total uptake and protein content as compare to application of panchgavya @ 2%, 6%, 8% and 10% where as lowest value recorded no panchgavya application (control). Further, application of panchgavya on branching+flowering recorded maximum nitrogen, phosphorus, potassium content in seed and straw and their total uptake and protein content as compare to application of panchgavya at branching and flowering stage alone. However; there were no interaction was found between panchgavya application doses and application stages.

Keywords: Mungbean, Panchgavya, doses, stages and quality

Introduction
Pulses stand a strategic position in the agriculture economy of our country. They contain high percentage of quality protein three times more than cereals. Pulses contain vitamin B, minerals and also contain a certain quality fiber, which is desirable in human diet because of medical consideration. Pulse crops enrich the soil through symbiotic nitrogen fixation from atmosphere. Besides being a rich source of protein, they maintain soil fertility through biological nitrogen fixation in soil and thus, play a vital role in sustainable agriculture. Mungbean is one of the most important pulse crops and an excellent source of high-quality protein. India alone accounts for 65% of its world acreage and 54% of the total production. Due to short duration nature, it is an excellent crop to fit in intercropping system with different major crops. It is an important conventional pulse crop of India. The calorific value of green gram is 334 calories per 100 g. it is known for high nutritional content crude protein 24.0%, fat 1.3%, carbohydrate 56.6%, minerals 3.5%, lysine 0.43%, methionine 0.10% and tryptophan 0.04%. The World Health Organization recommends a per capita consumption of pulses at 80 g/day and the Indian Council of Medical Research (ICMR) has recommended a minimum consumption of 40 g/day. It has a wide range of adaptability due to short growth period, high tonnage capacity and outstanding nutritional values of food, feed and forage. In Sanskrit panchgavya means blend of five substances obtained from desi cow, which is mixture of 5 products of cow such as cow dung, cow urine, cow milk, cow curd and cow ghee in a proper ratio (5:3:2:2:1) to this banana, jaggery and coconut water is added that allows it to ferment and the product is known as panchgavya. In the past decade, the use of panchgavya is getting adaptive popularity in Indian agriculture. It has got reference in the scripts of Vedas and Vrikshayurveda (Natarajan, 2002) [5]. The Panchgavya is an effective plant growth stimulator that enhances even the biological efficiency of crops and provide immunity to plant system. It can be used as foliar spray and fertigation along with irrigation water to soil. It has modest NPK content of 0.10, 0.017, 0.019 per cent respectively. It also contains micronutrients and plant growth promoting hormones like

IAA and GA, essential amino acids, vitamins and many beneficial microorganisms. The modern interest to produce organically grown crops and vegetables ensures health protection and maintenance of quality environment. As a substitute to chemical fertilizers, organic formulation such as panchgavya is developed and used. The use of organic products for plant growth improves the quality and prolong shelf life period of the produces.

Materials and methods

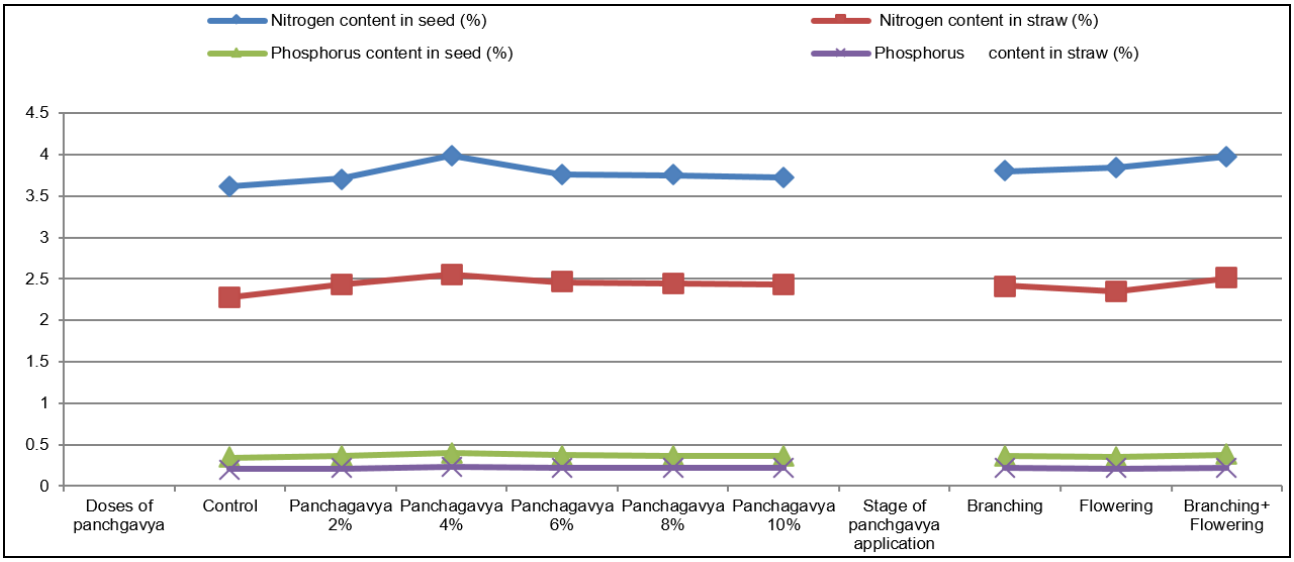
The field experiment was carried out during *kharif* season (2023) to study the "Effect of Panchgavya on Quality Parameters of Mungbean [*Vigna radiata* (L.) Wilczek]" in split plot design (SPD) with consisted two factor of panchgavya *i.e.* application doses and application stages at Research Farm, Suresh Gyan Vihar University-Jaipur, Rajasthan. The experimental farm is geographically located at 75° 51'44" E longitude, 26°48'35'' N latitude and an altitude of 432 m above mean sea level (AMSL). The soil of experimental field was sandy loam and the soil fertility status contained available nitrogen (137.8 kg ha^{-1}) by Subia and Asija 1996, available phosphorus (16.3 kg ha^{-1}) by Olsen *et al*. 1954 and available potassium (250.12 kg ha^{-1}) by Jackson, 1973. The organic carbon content was from 0.34-0.38 per cent. The weekly mean maximum maximum temperatures go as high as 48 ^{0}C during summers and minimum temperature falls as low as-1.0 ^{0}C during winters. The mean relative humidity fluctuated from 63 to 91 per cent during the crop season. The average rainfall is 400-500 mm per annum, which is mostly received during July to September. The sporadic showers during winters are also common, which are probably observed during this period. The experiments was laid out in split plot design (SPD) with three replications and 18 treatments of combination of consisted two factor of panchgavya *i.e.* application doses (conteol, 2%, 4%, 6%, 8% and 10%) and application stages (branching, flowering and branching + flowering). The parameters was analysed by statistical methods (Fisher, 1950) [2].

Result and Discussion

It is clear from the result of present study that, panchgavya applications had significantly affected the quality parameters of mungbean. Application of panchgavya @ 4% recorded the highest nitrogen content (3.99% and 2.55% in seed and straw, respectively), phosphorus content (0.400% and 0.229% in seed and straw, respectively) was presented in table-1, whereas potassium content (1.32% and 2.19% in seed and straw, respectively) and protein content in seed (24.96%) was illustrated in table-2. Further results revealed that the application of panchgavya on branching + flowering stage recorded maximum nitrogen content (3.98% and 2.51% in seed and straw, respectively), phosphorus content (0.381% and 0.223% in seed and straw, respectively) was presented in table-1, whereas potassium content (1.31% and 2.18% in seed and straw, respectively) and protein content in seed (24.87%) was presented in table-2, over application of panchgavya on branching and flowering alone. However, application of panvhgavya @ 2%, 6%, 8% and 10% remained statistically at par with each other. panchgavya contains N (527 ppm), P_2O_5 (371 ppm), K_2O (371 ppm), S (49 ppm), Fe (114 ppm) and Zn (72 ppm) besides reducing sugars (glucose) which increased nitrogen, phosphorus and potassium content in seed and straw. Protein content is directly related to nitrogen content by megnitude of 6.25 (A.O.A.C., 1960) [1]. The similar results was also noted by Machhar *et al.*, 2021 [4], Sakpal *et al.*, 2021 [9] and Suthar, 2024 [12].

Table 1: Effect of panchgavya doses on nitrogen and phosphorus content in seed and straw at different application stages

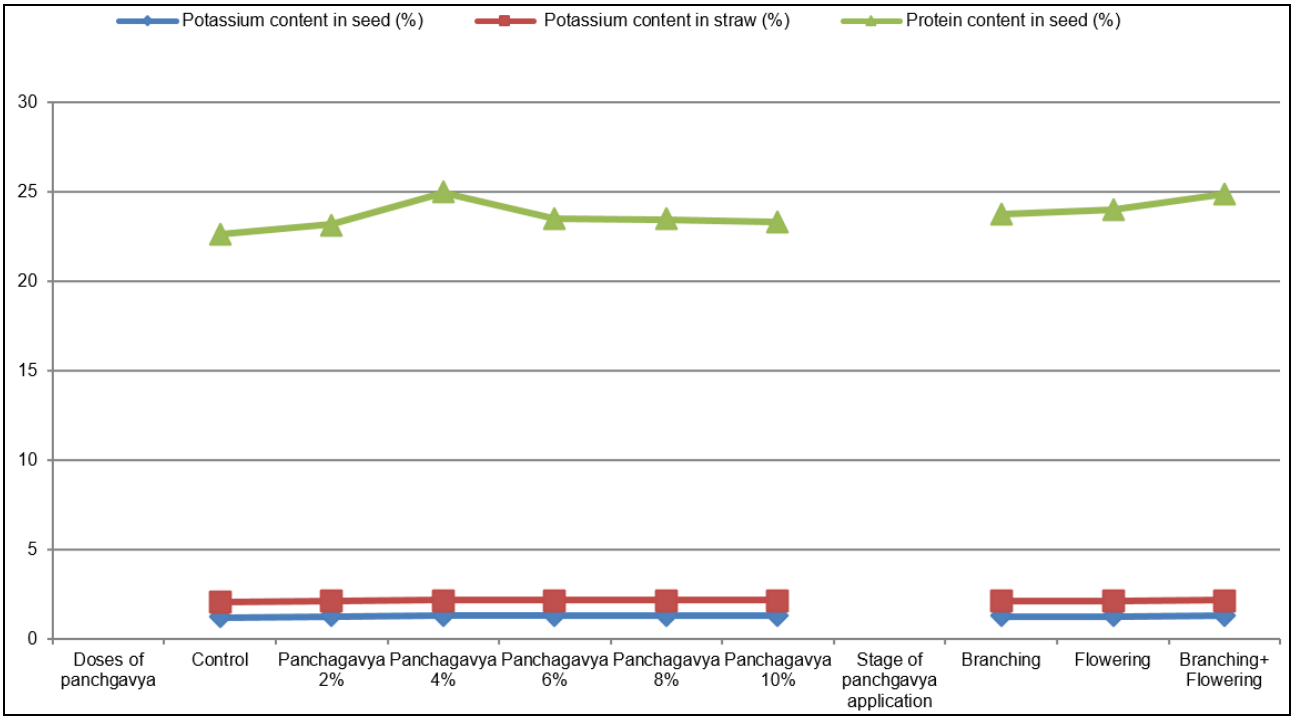
Treatment	Nitrogen content in seed (%)	Nitrogen content in straw (%)	Phosphorus content in seed (%)	Phosphorus content in straw (%)
Doses of panchgavya				
Control	3.62	2.28	0.346	0.207
Panchagavya 2%	3.71	2.43	0.360	0.211
Panchagavya 4%	3.99	2.55	0.400	0.229
Panchagavya 6%	3.76	2.46	0.372	0.221
Panchagavya 8%	3.75	2.45	0.369	0.219
Panchagavya 10%	3.73	2.43	0.365	0.217
SEm±	0.05	0.04	0.008	0.003
CD (P=0.05)	0.14	0.13	0.022	0.008
CV (%)	3.20	2.97	3.08	2.65
Stage of panchgavya application				
Branching	3.80	2.42	0.366	0.214
Flowering	3.84	2.35	0.355	0.211
Branching+Flowering	3.98	2.51	0.381	0.223
SEm±	0.03	0.03	0.005	0.002
CD (P=0.05)	0.09	0.08	0.014	0.005
CV (%)	3.08	2.65	2.98	2.35



Graph 1: Effect of panchgavya doses on growth attributes of mungbean at different application stages

Table 2: Effect of panchgavya doses on potassium content in seed and straw and protein content in seed of mungbean at different application stages

Treatment	Potassium content in seed (%)	Potassium content in straw (%)	Protein content in seed (%)
Doses of panchgavya			
Control	1.22	2.07	22.63
Panchagavya 2%	1.28	2.11	23.17
Panchagavya 4%	1.32	2.19	24.96
Panchagavya 6%	1.32	2.17	23.52
Panchagavya 8%	1.31	2.17	23.45
Panchagavya 10%	1.31	2.16	23.31
SEm±	0.011	0.015	0.3
CD (P=0.05)	0.03	0.043	0.84
CV	2.87	2.34	7.20
Stage of panchgavya application			
Branching	1.28	2.13	23.75
Flowering	1.28	2.11	23.99
Branching+ Flowering	1.31	2.18	24.87
SEm±	0.007	0.01	0.19
CD (P=0.05)	0.02	0.028	0.55
CV	2.53	2.13	6.78



Graph 2: Effect of panchgavya doses on potassium content in seed and straw and protein content in seed of mungbean at different application stages

Conclusion

Based on the results of one year experimentation, it may be concluded that the application of panchgavya @ 4% was the most effective treatment in increasing N, P and K content in seed and straw and protein content in seed of mungbaean. Further panchgavya application at branching+flowering stage recorded significantly higher N, P and K content in seed and straw and protein content in seed of mungbaean compared to its application at branching or flowering stage alone.

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