



EFFECTS OF DIFFERENT MILK SAMPLES ON SEED PRIMING OF *VIGNA RADIATA* (L.) R. WILCZEK

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The milk is very useful part of human diet, because it has good nutritive values as it contains essential minerals such as calcium, magnesium, copper and proteins (casein, lactalbumin and lactoglobulin) as reported from milk of different cattle like cow (CW), goat (GT), buffalo (BF) and camel (CL). Because of these nutritional qualities, it found suitable in farming for pretreatment of seeds before sowing which is called as "seed priming". In current study we carried out the effect of different milk samples as seed priming treatment resulting in enhanced the seed germination of *Vigna radiata* (up to 100%), increase the biomass and influence the vegetative parameters like root-shoot length. Highest root length of 6.90 cm and 7.42 cm was noticed with CW milk (100% concentration) and GT (100% concentration) respectively. Highest biomass of root (0.34 gm) after treatment with goat milk (100% concentration) and shoot (0.93 gm) treated with CW milk (50% concentration) is observed. Total chlorophyll content was found (5.04 µg/ml) with BF milk (100% concentration) and protein content of 565.13 µg/ml is observed after treatment with BF milk (50% concentration). Presence of magnesium and copper in milk is considered as useful for better seed germination after seed priming.

Keyword: Cattle milk, Bavistin, Seed germination, Seed priming, *Vigna radiata*

Introduction

India is the land of agriculture. Farmers rely more on traditional and sustainable farming instead of use of synthetic fertilizers. During farming, seed priming is generally ignored. The benefit of seed treatments lead to increase germination rate and ensure uniform seedling development. Seed priming has received great attention in recent years. Because it has some advantages over synthetic priming, like they neither denature the soil components, nor inhibit the growth of useful microorganisms. South Indian farmers specially in Karnataka and Tamil Nadu are using this technique with seeds of *Zea mays* for better crop yield¹. India, Nepal, Pakistan and Bangladesh improved

the yield of chickpeas by applying seed priming with cattle milk^{2,3,4}. Earlier studies show the effect of pre-sowing seed treatment by using various organic and inorganic treatments such as coconut milk water, rice water, ascorbic acid, KCl, KNO₃, ZnSO₄, CaCl₂. Under saline condition root and shoot length, number of leaves and dry weight of seedlings were taken as growth parameters. Results revealed that highest seed germination was observed in KNO₃ primed seeds (95%) and lowest was recorded in ascorbic acid treated seeds (82%). Other chemicals show positive response for seed germination compared to control treatment⁵. In this study various cattle milk including cow, buffalo, goat and camel were used as seed

primers in different concentration as 50% and 100% in respect to H₂O (control) and synthetic primer (Bavistin [carbendazim (C₉H₉N₃O₂), benomyl (C₁₄H₁₈N₄O₃)] were used. Milk of Gir variety of cow, Murrah of buffalo, camel (*Camelus dromedaries*) and beetle variety of goat were used. Experiments were performed in field (using pots) and in laboratory.

Material and Methods

Seeds of *Vigna radiata* (L.) R. Wilczek variety MDGGV-16 were procured from Udaipur Krishi Kendra, Udaipur (Raj.) India. Milk samples of cow (gir) and buffalo (surati) were obtained from Department of Animal Husbandry, Rajasthan College of Agriculture, Udaipur, Rajasthan. Camel and goat milk samples were collected locally near Udaipur. A range of experiments were performed with 50%, 100% concentration of milk samples.

Sterilized mixture of red black soil was used. Seeds were sown in plastic pots of size 20 cm × 16 cm. The experiments were conducted during July-December, 2018 for 25 days in green house and in laboratory (*in vitro*) at 28°C temperature, 40% humidity. Ten seeds of *Vigna radiata* were taken and soaked in different concentrations of cattle milk for 12h for seed priming treatment. After soaking, seeds were allowed to dry for half an hour at room temperature and then used for sowing. The results in terms of seed germination, root and biomass growth were observed at 50% and 100% concentration of milk. These experiments were performed in field in green house (in pots) and laboratory conditions. The percentage rate of seed germination is estimated by counting number of germinated seed after 72 hours of sowing. The chlorophyll 'a', 'b' and total chlorophyll were determined by spectrophotometer. Proline content in the plant were estimated using ninhydrin method⁷. Protein content was quantified by BSA method⁸. All experiments were carried out in triplicates.

Results and Discussion

Result revealed that except BF (100% conc.) and CL (100% and 50% conc.) are showing low germination rate among selected milk concentrations (Table 1). Germination rates were 80% and 75% recorded in bavistin and control respectively. Some physiological and biochemical processes start with process of imbibition. There are some studies in which priming enhanced the imbibition process in seeds which in turn boost germination^{9,5}. The presence of micro nutrients in cattle milk enhance the metabolic activities in embryo residing in the seed which results in better germination rate¹⁰. Protein content in leaves of seedlings germinated from seed treated with CL (100% conc.) was 0.686 µg/gm as compare to control which contain 0.575 µg/gm. Similarly seed treated with 50% concentration of BF milk found to contain 0.696 µg/gm protein.

Seed priming enhance the total chlorophyll contents in leaves which has positive influence on the rate of photosynthesis. The highest chlorophyll a and b recorded in BF (100% conc.) and GT milk (50% conc.). There is a study in which water primed seeds (12 hours) and CaCl₂ primed seeds (2 hours) also yielded good amount of chlorophyll in seedlings¹¹. The seeds of *Vigna radiata* lose their yellow pigment in bavistin solution and yielded dwarf plants. is a synthetic seed primer which contain harmful chemical carbendazim and benomyl which are toxic for microorganism and invertebrates, especially earthworms. The US environment protection agency considered carbendazim as a possible human carcinogen¹². On the other hands, there are no side effects reported on using cattle milk as a seed primer. Further, desirable plant height and root length, more chlorophyll in plant leaves were observed. Higher amount of proline reported in plants which germinated from bavistin primed seeds, and the presence of

proline in plant is indication of biotic and abiotic stress¹³.

This study revealed that seed priming with different milk samples has enough potential to enhance the percentage seed

Conclusion

Table 1: Physical and biochemical parameters after seed priming with different concentration of milk samples

Concentration of milk	Germ. (%)	Root length (cm)	Shoot length (cm)	Root biomass (gm)	Shoot biomass (gm)	Chlorophyll			Protein µg/gm	Proline µg/gm
						Chl. a (µg/gm)	Chl. b (µg/gm)	Total (µg/gm)		
Control(H ₂ O)	75	2.90	5.78	0.21	0.52	1.21	0.90	0.21	412.20	0.06
Bavistin (synthetic primer)	80	3.16	6.18	0.24	0.59	1.60	1.20	0.40	463.11	0.07
Buffalo 100%	85	5.32	7.2	0.09	0.90	3.37	1.66	1.70	485.87	0.05
Goat 100%	100	5.64	7.42	0.34	0.91	1.60	0.78	0.82	436.12	0.04
Cow 100%	100	6.9	6.5	0.15	0.57	1.95	0.72	1.23	488.40	0.06
Camel 100%	85	4.38	5.46	0.05	0.54	1.52	0.42	1.08	556.70	0.06
Buffalo 50%	100	2.96	5.28	0.01	0.91	1.74	0.53	1.20	565.13	0.02
Goat 50%	100	4.64	4.7	0.07	0.53	2.54	0.77	1.77	416.73	0.05
Cow 50%	100	3.36	5.04	0.12	0.93	1.87	0.75	1.12	516.23	0.22
Camel 50%	90%	4.86	6.52	0.12	0.91	1.59	0.68	0.91	406.61	0.21

Germination in comparison to control and synthetic primer. Although synthetic primer resulted in significant germination but it has limitation of affecting soil fertility and crop productivity directly. Therefore, milk is eco-friendly alternative for seed priming purposed and can be useful in agricultural practices.

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