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Evaluation of *Panchgavya* as source of nutrient for *Cymbidium* orchids

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The experiment was undertaken during 2009 to 2012 to study the different concentration of panchgavya on the growth and flowering of *Cymbidium* 'Sleeping Nymph'. The media application of 1:30 panchgavya registered highest pseudobulb length and girth and resulted in 31.66 and 41.3% increase over control, respectively. Furthermore, the number of spikes per plant, floret per spike, spike length and rachis length were recorded highest in the media application of panchgavya at 1:30 and resulted in 130, 55.3, 22.4 and 26.3% increase over control, respectively. Among the foliar application of panchgavya, the treatment receiving panchgavya at 1:30 (T_3) performed better for growth and flowering of *Cymbidium* hybrid. The results confirmed that, the application of panchgavya at 1:30 either in media or in foliar application was best for the growth and flowering of *Cymbidium* hybrid.

Key words: *Cymbidium* hybrid, panchgavya, growth, spike production.

INTRODUCTION

Cymbidium is the top ranking orchid cut flower of the world and is known for unparallel beauty, attractive colour, long lasting waxy flowers used for indoor decoration and corsages. Now-a-days, they are gaining popularity as decorative pot plants with smaller but equally high quality flowers. In North eastern Himalayas, areas lying between 1500 to 2000 m from sea level are suitable for *Cymbidium* cultivation (Pradhan et al., 1995). Sikkim is harnessing the opportunity of cultivating *Cymbidium* as cut flower owing to its climatic advantage. *Cymbidium* orchids are cool growing plant and when it gets warm they are capable of growing at a faster rate.

Fertilization is one of the important aspects in increasing the flower yield of *Cymbidium* orchid. Now-a-days the application of nutrients through fertigation in *Cymbidium* cultivation is gaining popularity on account of higher cut flower and better plant health (Barman et al., 2008). After green revolution, there has been a tremendous increase in the use of chemical fertilizers and pesticides in agriculture, which has posed threats to ecology and environment. Therefore organic farming can be practiced as an alternative to maintain the productivity besides keeping the environment safe (Rawat, 2002). Among organic farming components, Biodynamic agriculture, Rhishi-Kheti, Panchgavya, Dasagavya, and Homa farming have emerged in different parts of India (Palanikumar, 2005).

Panchagavya, an organic product has the potential to play the role of promoting growth and providing immunity in the plant system. Panchagavya consists of five products viz., cow dung, cow urine, cow milk, curd, and ghee and used widely for agriculture and horticultural crops. Descriptions of this holy combination could be traced out in Vedas, the divine scripts of Indian wisdom.

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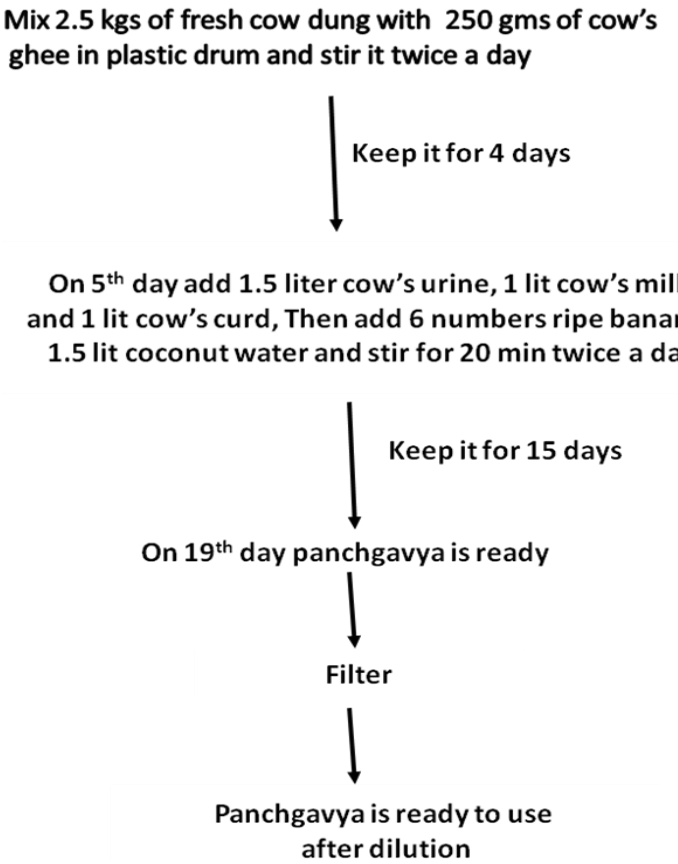

Figure 1. Preparation of 10 lit of Panchgavya.

Panchgavya contain macro nutrients, essential micro nutrients, many vitamins, essential amino acids, growth promoting factors like IAA, GA, and beneficial microorganisms (Natarajan, 2007; Sreenivasa et al., 2010). Panchagavya is used as a traditional method to safe guard plants and micro organisms and to increase plant production.

MATERIALS AND METHODS

The experiment was carried out at National Research Centre for Orchids, Pakyong, India during the year 2009 to 2012. One-year-old tissue cultured plants of *Cymbidium* 'Sleeping Nymph' were planted singly in the plastic pots and kept inside the locally made poly house. The media used for growing *Cymbidium* was the mixture of leaf mould, cocochips and brick pieces at 4:2:1 ratio. The temperature during the winter season (November to March) varied from 10 to 15°C and during wet season (April to October) varied from 15 to 25°C. The treatments comprised of T_1-Control, T_2-1 :50 (Panchgavya : water) foliar application, T_3- 1 :30 foliar application, T_4- 1 :20 foliar application, T_5- 1 :50 media application, T_6-1 :30 media application, T_7- 1 :20 media application. The preparation of panchgavya was described in Figure 1.

The panchgavya solutions were applied at fortnightly intervals. During winter season (November to February) application were restricted to once monthly. The chemical composition of panchgavya solution was given in Table 1. Growth parameters like plant height, length and girth of pseudobulb, number of pseudobulb per clump were recorded for two years. Flower parameter like number of spikes per plant, number of floret per spike, spike length and rachis length were recorded for one year.

The diluted panchgavya was analised for physico-chemical properties. The pH of the sample was measured using a pH meter (Systronics: Model 335). Electrical conductivity (EC) was determined with the help of an EC meter (Elico: Model CM 180). The available nitrogen content in panchgavya was determined by the method of Subbiah and Asija (1956). The available Phosphorus was estimated by Bray and curtz method (Bray and Curtz, 1945). Available Potassium was detected by flame photometer (Systronics: Model 128) method (Jackson, 1973). The exchangeable Calcium and Magnesium were estimated by Versenate method (Cheng and Bray, 1951). The experiment was set up in a completely randomized design (CRD) with three replications. Results were statistically analyzed for Duncan's Multiple Range Test (DMRT) using the statistical computer programme MSTAT, version 5 (New Delhi, India).

RESULTS AND DISCUSSION

Growth parameter

Application of different preparations of panchgavya to *Cymbidium* hybrid significantly influenced the plant growth parameters (Table 2). The media application of

Table 1. Physico-chemical characteristics of the panchagavya.

Parameter	Panchgavya : Water ratio		
	1:50	1:30	1:20
pH	4.60	4.51	4.53
EC (mS cm^{-1})	0.54	0.80	1.24
Available N (mg kg^{-1})	84	140	168
Available P (mg kg^{-1})	34	62	84
Available K (mg kg^{-1})	43	91	116
Exchangeable Ca (mg kg^{-1})	7	12	17
Exchangeable Mg (mg kg^{-1})	4.5	8	12

Table 2. Influence of Panchgavya on growth of *Cymbidium* 'Sleeping Nymph'.

Treatment	Plant height (cm)	Pseudobulb length (cm)	Pseudobulb girth (cm)	No. of pseudobulbs per clump
T_1 : Control	60.08^{c}	5.18^{d}	3.12^{d}	3.3^{b}
T_2 :1 :50 (Panchgavya : water) foliar application	62.36^{bc}	6.41^{c}	4.10^{c}	3.6^{ab}
T_3 : 1 :30 foliar	63.84^{b}	6.82^{abc}	4.41^{abc}	3.6^{ab}
T_4 : 1 :20 foliar	64.02^{b}	6.73^{abc}	4.36^{abc}	3.6^{a}
T_5 : 1 :50 media	63.02^{bc}	6.90^{ab}	4.51^{ab}	3.6^{ab}
T_6 :1 :30 media	62.82^{bc}	7.06^{a}	4.66^{a}	3.4^{ab}
T_7 : 1 :20 media	71.80^{a}	6.52^{bc}	4.23^{bc}	3.4^{ab}

Within a column, means followed by the same letter are not significantly different at the 0.05 level of probability by Duncan's multiple range test (DMRT).

panchgavya was found better than foliar application (Figure 2). The significant growth observations were recorded after 6 months of application of panchgavya. Among the foliar application of panchgavya (T_2, T_3, and T_4), there is no significant difference among the treatments on plant height. However, there is significant difference among the media application of panchgavya on plant height. It was observed that, the highest plant height of 71.8 cm was recorded in the treatment T_7 receiving 1:20 (Panchgavya : water) media application.

The foliar and media application of panchgavya significantly influenced the pseudobulb length and girth. Among the foliar application, the highest pseudobulb length and girth of 6.8 and 4.4 cm recorded in the treatment T_3 receiving 1:30 (Panchgavya : water), respectively. Similarly, among the media application, the treatment T_6, recorded the highest pseudobulb length and girth of 7.06 and 4.66 cm, respectively. Application of 1:30 (Panchgavya : water) either in foliar or in media was found to be best for the proper development of pseudobulb.

Naik et al. (2010) reported that, the pseudobulb of *Cymbidium* hybrid functions as water, minerals, and carbohydrate storage device and for the maturity of pseudobulb, less Nitrogen and more of Phosphorus and Potassium is required. The above findings are in conformity with our present investigations and confirm that the panchgavya solution of 1:30 having 140, 62 and 91 ppm of N, P and K, respectively was better than 1:20 and 1:50 ratio of panchgavya. The number of pseudobulbs per plant was found non significant among the treatments. All the growth parameters responded well to the application of panchgavya compared to control.

The presence of effective microorganisms and methylotrophs profile bacteria in the panchgavy enhanced the production of phytohormones like auxins and giberlins that might have stimulated the growth by increasing the plant height, pesudobulb length, pseudobulb girth, and number of pseudobulbs per plant as evidenced from the work of Xu (2000).

Flowering parameter

Application of panchgavya both as foliar and media significantly increased the different flower parameter like number of spikes per plant, number of floret per spike, spike length and rachis length over control (Table 3). The number of spikes per plant was highest (3) in the treatment T_6 receiving 1 :30 (Panchgavya : water) as media application and was at par with the treatment T_5. Further, among the foliar application, the treatment

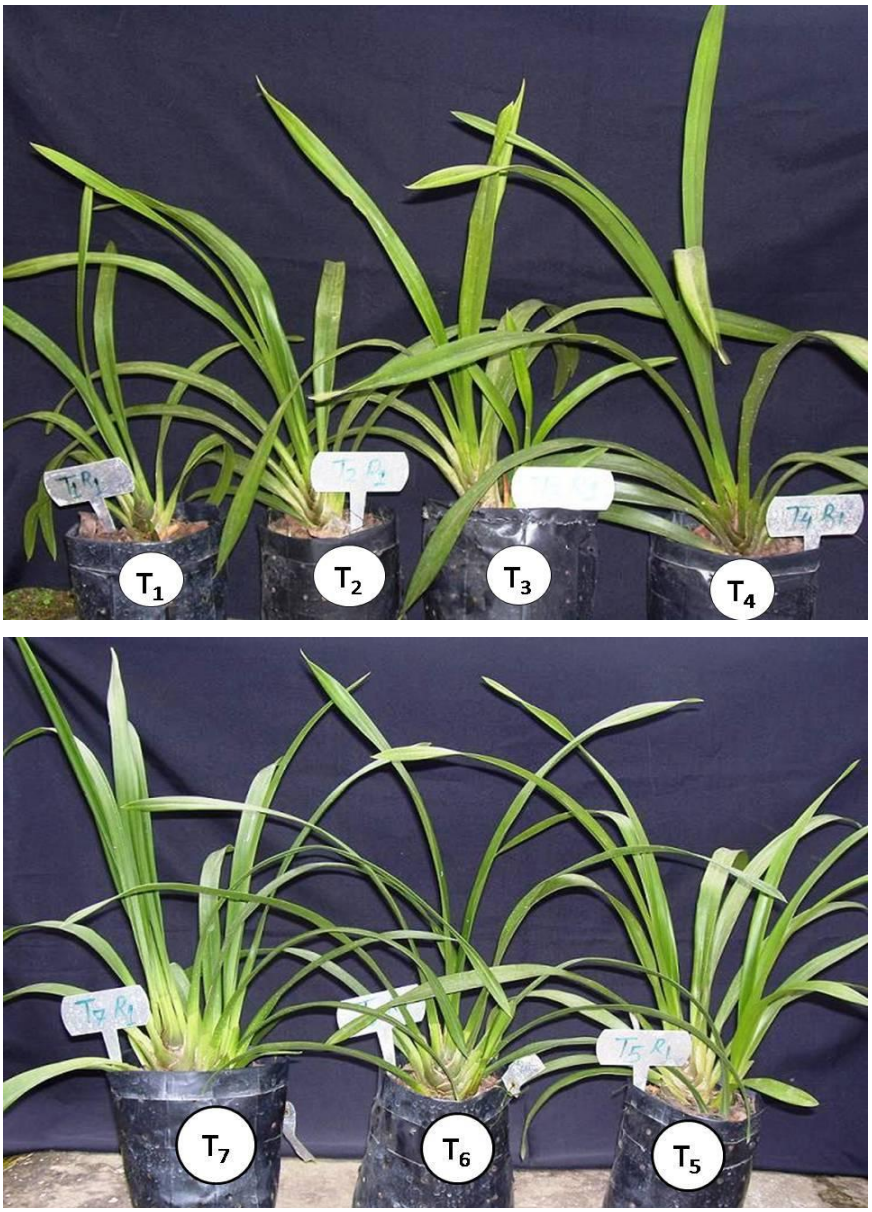

Figure 2. Effect of foliar and media application of panchgavya on growth of *Cymbidium* hybrid 'Sleeping Nymph.

Table 3. Influence of Panchgavya on flowering of *Cymbidium* 'Sleeping Nymph'.

Treatment	Number of spikes per plant	Number of floret per spike	Spike length (cm)	Rachis length (cm)
T_1 : Control	1.30^{e}	7.50^{e}	39.50^{e}	19.00^{d}
T_2 :1 :50 (Panchgavya : water) foliar application	2.00^{d}	9.40^{d}	41.35^{de}	20.50^{cd}
T_3 : 1 :30 foliar	2.60^{bc}	10.60^{b}	44.60^{bc}	21.20^{bc}
T_4 : 1 :20 foliar	2.33^{cd}	10.00^{c}	43.60^{bcd}	20.50^{cd}
T_5 : 1 :50 media	2.70^{ab}	11.25^{a}	46.00^{ab}	22.00^{bc}
T_6 :1 :30 media	3.00^{a}	11.65^{a}	48.35^{a}	24.00^{a}
T_7 : 1 :20 media	2.50^{bc}	10.25^{bc}	42.25^{cde}	22.50^{b}

Within a column, means followed by the same letter are not significantly different at the 0.05 level of probability by Duncan's multiple range test (DMRT).

T_3 recorded highest number of spikes per plant of 2.6. The number of floret per spike significantly increased with the application of different doses of panchgavya and was recorded highest of 11.65 in the treatment T_6 and was at par with the treatment T_5. Similarly, the spike length and rachis length were significantly increased with different treatments and recorded highest of 48.35 and 24 cm, respectively in the treatment T_6. The results of the present investigation were in agreement with the findings of Kumar et al. (2010), who reported that, application of 5% panchgavya resulted in highest florets per spike (10.55), spike diameter (0.80 cm), rachis length (41.90 cm) in gladiolus. The different flowering parameter like number of spikes per plant, number of floret per spike, spike length, and rachis length were found best in the treatment T_6 receiving 1 :30 (Panchgavya : water) as media application. Kalarani (1991) reported that, the action of the growth regulators in the plant system stimulated the necessary growth and development in plants and better yield. The preparation of Panchagavya includes coconut water, which contains kinetin which increases the biomass and yield (Mamaril and Lopez, 1997). Singh et al. (2007) observed the spike emergence (85.13 d) and number of days to first floret opening (25.13) in tuberose were earliest in Panchagavya (4%) spray.

Conclusion

The results confirmed that, panchgavya either in foliar or media application on Cymbidium hybrid 'Sleeping Nymph' resulted in better growth and spike production. Among the foliar application, the treatment T3 (1:30 foliar) recorded highest growth parameters and resulted in 31.6, 41.3 and 9 % increase in pseudobulb length, pseudobulb girth and number of pseudobulbs per clump, respectively over control. Further, flowering parameters like number of spikes per plant, number of floret per spike, spike length and rachis length registered 100, 41.3, 13 and 11.5 % increase over control in T3 treatment, respectively. Furthermore, the media application of panchgavya, T6 (1 :30 media) was statistically at par with foliar application, T3 treatment on growth habit of Cymbidium hybrid. Among all the treatments, the highest number of spikes per plant, number of floret per spike, spike length and rachis length were 3, 11.65, 48.35 cm and 24 cm, respectively in the media application of panchgavya, T6 and were significantly better than other treatments of media and foliar application.

REFERENCES

Barman D, Rajni K, Naik SK, Upadhyaya RC (2008). Production of Soulhunt-6 by manipulating cultural practices under partially modified greenhouse. Indian J. Hort. 65:69-72.

Bray RH, Kurtz LT (1945). Determination of total, organic, and available forms of phosphorus in soils. Soil Sci. 59:39-45.

Cheng KL, Bray RH (1951). Determination of calcium and magnesium in soil and plant material. Soil Sci. 72:449–458.

Jackson ML (1973). Soil Chemical Analysis. Prentice hall of India pvt. Ltd. New Delhi, India, P. 187.

Kalarani MK (1991). Senescence regulation in soybean (*Glycine max* (L.) Merrill). M. Sc. (Agri.) Thesis, Tamil Nadu Agriculture University, Coimbatore (India).

Kumar R, Deka BC, Roy AR (2010). Effect of bioregulators on vegetative growth, flowering and corm production in gladiolus cv. Candyman. J. Ornamental Hort. 13:35-40.

Mamaril JC, Lopez AM (1997). The effect of coconut water growth hormones (CWGH) on the growth, development and yield of sweet pepper (*Capsicum annuum* L.). Philippines J. Coconut Stud. 222:18-24.

Naik SK, Usha Bharathi T, Barman D, Rampal De LC, Medhi RP (2010). Basics of Orchid Nutrition. Technical Bulletin-5, National Research Centre for Orchids (ICAR), Pakyong, Sikkim, India. pp. 1-54.

Natarajan K (2007). Panchagavya for plant. Proceeding of National Conference on Glory of Gomatha, S. V. Veterinary Univ., Tirupati, pp. 72-75.

Palanikumar M (2005). Role of cow in organic horticulture. Kisan World 33:43-45.

Pradhan UC, Lachungpa ST, Pradhan GM (1995). Scope for commercial orchids growing in Sikkim and Darjeeling hills. In:

Proceedings of the Project Wesign Workshop on "Cultivation of Medicinal Plants and Orchids in Sikkim Himalaya (eds R.C Sundariayal and E. Sharma), pp. 13-18.

Rawat V (2002). Organic all the way. Agriculture Today **6**:55-56.

Singh B, Srivastava R, Chandra R (2007). Response of Panchgavya and Manchurian Mushroom Tea on Floral Characters in Tuberose (Polianthes Tuberosa Linn.) Cultivar Pearl Double. J. Ornamental. Hort. 10:250-254.

Sreenivasa MN, Nagaraj MN, Bhat SN (2010). Beejamruth: A source for beneficial bacteria. Karnataka J. Agric. Sci. 17:72-77.

Subbiah BV, Asija GL (1956). A rapid procedure for the determination of available nitrogen in soils. Current Sci. 25: 259-260.

Xu HL (2000). Effects of microbial inoculants and organic fertilizers in the growth, photosynthesis and yield of sweet corn. J. Crop Prod. 3:235-243.