

Full Length Research Paper

Effect of biofarming techniques on medicinal glori lily (*Gloriosa superba* L.) and soil fertility status

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Received 13 March, 2010; Accepted 28 January, 2014

Field experiment was conducted at the farmer's field at Devanur village of Ariyalur District, Tamil nadu during 2007 to 2008 to study the effect of biofarming techniques on the yield and soil fertility performance of glori lily (*Gloriosa superba* L.). The treatments consisted of different organic manures viz., T₁-control, T₂-Farm Yard Manure (FYM) at 12.5 t ha⁻¹, T₃- Enriched Farm Yard Manure (EFYM) at 750 kg ha⁻¹ and T₄-Pressmud compost at 5t ha⁻¹. Among the organic manures, application of EFYM at 750 kg ha⁻¹ (T₃) recorded the highest yield attributes like number of pods plant⁻¹, number of seeds pod⁻¹, test weight (g), seed yield and tuber yield. The N, P and K, uptake was higher with EFYM applied at 750 kg ha⁻¹ post harvest nutrient status of the soil, the nutrient statues was not affected when compared and control. Biofarming techniques recorded increased post harvest nutrient of N, P and K status which was recorded with FYM application at 12.5 t ha⁻¹.

Key words: *Gloriosa superba*, biofarming, yield performance and N, P and K nutrient status of the soil.

INTRODUCTION

India is endowed with a rich wealth of medicinal plants, which have contributed to the development of ancient Indian materia medica. In one of the earliest treatises on Indian medicine, the charak, samhita (1000 B.C.) records the use of over 840 drugs of plant origin. Glori lily *Gloriosa superba* L. is an important medicinal crop. It belongs to the family Liliaceae, being locally called as "Kanvali kizhangu" or Karthigai kizhangu" or Kalappai kizhangu (or) "Kanthazh" in Tamil. In India, it is cultivated in an area of 2000 ha and in Tamil nadu around 1000 ha with an annual production of 650 Mt of seeds and tubers. It resumes new growth by July to September and produces flowers during October to November (Swarnapriya et al., 1995). It is a native to tropical Asia

and Africa and found growing throughout tropical India upto an altitude of 2500 m (Chopra et al., 1956).

Commercial cultivation of this crop is mostly confined to the Southern states of India (Ramesh, 1964). The drug extracted from the seed is bitter, pungent and astringent in taste. In Ayurvedic system of medicine, the underground rhizomes are used since ancient times as an anti-inflammatory and anti-leprotic. The drug from the tuber is a gastro-intestinal irritant and may cause vomiting or purging. It is useful in demotosis, piles, chronic ulcers, colic pain and as a cataplasm in neuralgic pains. The white starchy powder made from the tubers after washing with water is used in the treatment of gonorrhoea and the leaf juice is used for killing head lice.

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Table 1. Effect of biofarming techniques on number of pods plant⁻¹ and number of seeds pod⁻¹ of glori lily.

S/N	Treatments	No.of Pods plant ⁻¹	No.of Seeds pod ⁻¹
1	T ₁ - Control (Untreated)	17.97	41.30
2	T ₂ - FYM at 12.5 t ha ⁻¹	18.59	43.43
3	T ₃ -EFYM at 750 kg ha ⁻¹	20.36	44.34
4	T ₄ - Pressmud Compost at 5 t ha ⁻¹	18.80	43.84
S.E _D	-	0.44	0.28
CD (P=0.05)	-	0.63	0.40

Table 2. Effect of biofarming techniques on hundred seed weight (g), seed and tuber yield (kg ha⁻¹) of glori lily.

S/N	Treatments	Hundred seed wt (g)	Seed yield (kg ha ⁻¹)	Tuber yield (kg ha ⁻¹)
1	T ₁ - Control (Untreated)	2.14	529.25	1872.86
2	T ₂ -FYM at 12.5 t ha ⁻¹	2.21	573.61	1949.37
3	T ₃ - EFYM at 750 kg ha ⁻¹	2.31	686.34	2147.85
4	T ₄ - Pressmud Compost at 5 t ha ⁻¹	2.20	589.26	1968.91
S.E _D	-	0.04	0.74	2.07
CD (P=0.05)	-	0.06	1.81	5.0

The underground stocks have been used as an abortifacient and hence the name "Garbhaghatini." The tubers are administered to cattle for expulsion of worms and also used as an adulterate of Aconite (Rao, 1914). The seed of glori lily was found to be good source of colchicines 3-Dimethylcolchicine and colicoside (Chaudhuri and Thakur, 1993). The root pieces after certain pre-treatments and preservation are administered as an antidote in cobra poisoning. In scorpion and centipede sting, on application of the paste of the root, relief is obtained (Kirtikar and Basu, 1975).

According to Amzad Hossian and Yukio Ishimine (2007), application of Farmyard Manure showed an excellent efficacy on growth parameters and yield of turmeric over control. They also found that the yield of turmeric increased four to five times with application of FYM in dark red soil and grey soil, whereas the manure applied in red soil resulted three times higher yield than control highest yield which was recorded with application of organic manures reported by Singh (1969) in Potato.

Application of Pressmud at 20 t ha⁻¹ significantly increased the plant height, grain and straw yield of ragi (Indira Raja and Raja, 1981). The bulky organic manure requires improvement in quality with reference to its nutrient content through enrichment, Shailendranath and Rao (1979), reported pre-treatment of farmyard manure (FYM) with urea and phosphate fertilizer had significantly increased growth and yield on medicinal plants. Nayak (1993), reported that application of one tone of enriched farmyard manure (EFYM) ha⁻¹ was on par with six tons of conventional farmyard manure ha⁻¹ in increasing yield on medicinal plants (Table 1).

Use of organic manures sustain the crop productivity by improving soil physical conditions such as water holding

capacity, hydraulic conductivity and infiltration rate, besides reducing environmental pollution and reducing the cost of inorganic fertilizers. Plant nutrient can be supplied through organic manures, biofertilizers for effective utilization of resources and to produce crops with less expenditure, the organic nutrient management is the best approach. Solaimalai et al. (2001), reported that pressmud is rich in many plant nutrients and it also has properties to ameliorate degraded soils. Research works have indicated that application of pressmud improves soil fertility, nutrient uptake and yield of medicinal herb of *Ocimum sanctum*. Krishnamurthy et al. (2002), observed that application of pressmud at the rate of 10 t ha⁻¹ recorded 17.2, 22.6 and 22.0% increase in plant height, number of tillers per plant and rhizome yield of turmeric, respectively over control.

MATERIALS AND METHODS

Field experiment was conducted during July, 2007 to December, 2008 under rainfed conditions in a farmer's field at Devanur village of Ariyalur district in Tamil nadu, to study the effect of biofarming techniques on the seed and tuber yield of glori lily. The experimental field was red loamy soil with pH 6.5, available nitrogen (231 kg ha⁻¹), available phosphorus (16 kg ha⁻¹) and available potassium (293 kg ha⁻¹). The experiment was laid out in randomized block design (RBD) with four replications. Different organic manures Viz., T₁ - Control, T₂ - FYM at 12.5 t ha⁻¹, T₃ - EFYM at 750 kg ha⁻¹ T₄ - pressmud compost at 5 t ha⁻¹ were tried (Table 2).

RESULTS AND DISCUSSION

All the organic manure treatments had significant

Table 3. Effect of biofarming techniques on crop nutrient uptake of nitrogen, phosphorus and potassium (kg ha⁻¹).

S/N	Treatment	Nitrogen (kg ha ⁻¹)	Phosphorus (kg ha ⁻¹)	Potassium (kg ha ⁻¹)
1	T ₁ - Control (Untreated)	101.94	27.64	99.30
2	T ₂ - FYM at 12.5 t ha ⁻¹	105.90	27.63	102.30
3	T ₃ - EFYM at 750 kg ha ⁻¹	107.89	31.54	102.47
4	T ₄ - Pressmud compost at 5 t ha ⁻¹	106.21	28.67	100.24
S.E _D	-	0.90	0.58	0.08
CD (P=0.05)	-	1.62	0.83	0.14

Table 4. Effect of biofarming techniques on Post harvest soil available nitrogen, phosphorus and potassium (kg ha⁻¹).

S/N	Treatment	Nitrogen (kg ha ⁻¹)	Phosphorus(kg ha ⁻¹)	Potassium (kg ha ⁻¹)
1	T ₁ - Control (Untreated)	220.93	16.17	279.43
2	T ₂ - FYM at 12.5 t ha ⁻¹	221.20	17.50	286.26
3	T ₃ - EFYM at 750 kg ha ⁻¹	220.82	16.30	283.33
4	T ₄ - Pressmud compost at 5 t ha ⁻¹	221.07	16.24	283.08
S.E _D	-	0.06	0.46	1.92
CD (P=0.05)	-	0.12	1.12	2.10

*S.E_D-Standard error deviation, CD-critical difference, p-probability level.

influence on yield attributes, seed yield and tuber yield. Application of EFYM at 750 kg ha⁻¹ (T₃) recorded significantly higher yield attributes viz., number of pods plant⁻¹ of 20.36, number of seeds pod⁻¹ of 44.34, test weight of 2.31g, seed yield of 686.34 kg ha⁻¹ and tuber yield of 2147.85 kg ha⁻¹. Seed and tuber yield were significantly increased by the use of organic manure sources. Similar findings of increased tuber and seed yield due to use of organic nutrient source was reported by Warade et al. (1995) in onion. All the treatments had significant influence on the nutrient uptake in gloriosa crop. Among the treatments, application of EFYM at 750 kg ha⁻¹ (T₃) treatment enabled the gloriosa crop to absorb higher nutrients to the extent of 107.89, 31.54 and 102.47 kg of N, P₂ O₅ and K₂O ha⁻¹, in the crop respectively. This was followed by T₄ (Pressmud at 5 t ha⁻¹) which recorded 106.21, 28.67 and 100.24 kg of N, P₂ O₅ and K₂O ha⁻¹ respectively was recorded under inorganic manure application (T₁- control) (Tables 3 to 4).

Conclusion

Among the treatments, application of FYM at 12.5 t ha⁻¹ (T₂) recorded the highest available soil nitrogen, phosphorus and potash of 221.21, 17.50 and 286.26 kg ha⁻¹ and the least post harvest available soil NPK of 220.82, 16.17 and 283.33 kg ha⁻¹ were recorded in EFYM at 750 kg ha⁻¹ (T₃). Similar finding of increased post harvest NPK status due to use of organic nutrient source was reported by Nayak (1993) in ragi. Based on the

above results, it can be concluded that the use of EFYM at 750 kg ha⁻¹ is found to be an appropriate agro-technique for augmenting the productivity of gloriosa lily.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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