

Pharmacognostical Standardization

A comparative study on growth pattern of *Langali* (*Gloriosa superba* Linn.) under wild and cultivated conditions

K. V. Asha, N. Rajashekhar¹, M.G. Chauhan², B. Ravishankar³, P. P. Sharma⁴

Department of Agada Tantra, Kottakkal Ayurveda College, Kottakkal, Kerala, ¹Department of Dravyaguna, K.V.G. Ayurveda Medical College, Sullia – 574 327, Dakshina Kannada District, Karnataka, ²Medicinal Plant Collection section, ³Pharmacology Laboratory, ⁴Department of Dravyaguna, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, Gujarat, India.

Abstract

Langali (*Gloriosa superba* Linn.), obtained from wild habitat and by experimental cultivation under three groups, viz., control, cultivated as per the modern agricultural guidelines and as per the norms of *Vriksha-ayurveda* was compared and analyzed. Methods of *Vriksha-ayurveda* give good result in the case of *Langali* in terms of yield. Failure of control groups both in seed and tuber batches denotes that this plant needs some treatment for vegetative propagation under artificial conditions. *Ayurveda* group may be considered as a better one in the assessment of reproduction capacity in terms of yield of seeds.

Key words: Cultivation, *Langali* (*Gloriosa superba* Linn.), modern chemical, survey, *Vriksha-ayurveda*, wild.

Introduction

The use of plants is as old as human civilization. The unique diversity of the Indian subcontinent in culture and natural vegetation made our ancient seers enlighten the vast knowledge about the medicinal plants. The state of Gujarat alone possesses nearly 2000 plant taxa. Of them, 751 are medicinally important. Total number of plants used by pharmacies is about 150, of which some are of extremely limited distribution. The wild resources are tapped indiscriminately to meet the need on many occasions, while some are imported and some are cultivated at present. Rig Veda (1500 BC) Atharva Veda (500 BC), Krishi Prasara (400 BC), Arthashastra of Kautilya (300 BC), Brihat Samhita of Varaha Mihira (500 AD), Krishisukta of Kasyapa (800 AD), *Vriksha-ayurveda* of Surapala (1000 AD), etc., describe about the methods of cultivation of the plants.^[1-7]

With this background, this work has been undertaken to analyze and compare the drug *Langali* (*Gloriosa superba* Linn.) obtained from wild habitat and the cultivated form, analytically and pharmacologically.^[8]

Address for correspondence: Dr. N. Rajashekhar,
Department of Dravyaguna, K.V.G. Ayurveda
Medical College, Sullia – 574 327, Dakshina
Kannada District, Karnataka, India.
E-mail: drnraj06@rediffmail.com

DOI: 10.4103/0974-8520.72413

Aims and objectives

1. To analyze and compare the drug *Langali* (*G. superba* Linn.) obtained from wild habitat and by cultivation under modern chemical method and *Vriksha-ayurveda* method.
2. To compare the drug *Langali* (*G. superba* Linn.) obtained from wild habitat and by cultivation under modern chemical method and *Vriksha-ayurveda* method pharmacologically.

Materials

1. To obtain the drug from its natural habitat (wild form).
2. To obtain the drug by experimental cultivation under three groups, viz., control, cultivated as per the modern agricultural guidelines and cultivated as per the norms of *Vriksha-ayurveda*.

Methods

1. Collection of the planting material, planting the authentic samples of identical weight in the natural habitat of the plant and leave them to have a natural growth by exposing them to existing soil and weather conditions.
2. Collection of sample from the natural habitat and planting them of identical weight in three groups, viz., control, agronomical method and *Vriksha-ayurveda* method.
3. Evaluation of growth habit of the samples of all the three groups like number and area of leaf, total length of the plant, branches, germination time, percentage of germination, flowering time, fruiting time, size of the pod,

Table 1: Consolidated data of survey of the plant (qualitative and quantitative)

Parameter	District		
	Thrissur	Palghat	Malappuram
Total length (cm)	70–248	120–180	90–192
Leaf length (cm)	12–21.5	NI	NI
Leaf breadth (cm)	3–4.7	NI	NI
Arrangement of leaf	Alt., Opp., Whorl	Whorl, Alt., Opp.	Opp., Alt., Whorl
No. of petioled leaves	0–4	NI	NI
No. of nodes	19–60	25–50	23–90
Avg. internodal length (cm)	3–5.2	2.18–4.7	2.8–4.9
No. of branches	0–17	0–15	0–8
Avg. no. of flowers/branch	0–5	Nfl-2	Nfl
No. of fruits	1–15	8–42	0–24
No. of seeds/pod	10–37	19.6–37.77	0–34.14
Wt. of pod (g)	3–12	3–11	0–9
Wt. of 100 seeds (mg)	0.5–3000	1056–1200	0–13,800
Shape of yam	Bifurcate-longitudinal	Long-bifurcated	Bifurcated
Associated flora	12–72 <i>Mucuna</i> , hibiscus, Bougainvillea, <i>Clitoria</i> , wild G. Gram	12–52 Grass, hibiscus, <i>Tragia</i> , <i>Clitoria</i> , <i>Mucuna</i> , <i>Phaseolus</i>	13.2–52 <i>Tragia</i> , grass, bamboo, <i>Mucuna</i> , hibiscus, teak

Alt: Alternate; Opp: Opposite

Table 2: NPK analysis of soil

Estimations	pH	Important nutrient factors		
		Organic carbon	Phosphorus (P) kg/Ha	Potassium (K) kg/Ha
Value	6.6	0.74	35.1	89.6
Rating	Moderate	Moderate	Higher	Low
Class	6	3	9	2

Source: Soil testing laboratory, Coimbatore, Tamil Nadu

Table 3: Presence of micronutrients in the soil

Site	Micronutrients (ppm)			
	Zinc	Copper	Manganese	Iron
Cultivation	0.80	1.20	10.02	30.15
Natural plantation	1.40	2.98	13.07	28.87

Source: Soil testing laboratory, Coimbatore, Tamil Nadu

Table 4: Manuring

Lands for different cultivation	After 30 days	After 60 days	After 90 days
Natural habitat	No manuring	No manuring	No manuring
Cultivation control	No manuring	No manuring	No manuring
Cultivation chemical	NPK (50:20:30)	N	N
Cultivation Ayurveda	<i>Kunapa jala</i>	<i>Kunapa jala</i>	Cow's urine, neem oil cakes

seeds in a pod, weight of the pod, weight of 100 seeds, etc., classification of the drug according to the morphologic characters described in *Vriksha-ayurveda*, assessment of the *Prakriti* of plant and the doshik predominance of the groups.

Table 5: Composition of modified Kunapa jala

Item	Quantity
Rat meat (cooked)	1 kg
Fish meat (cooked)	0.5 kg
Goat meat (cooked)	0.5 kg
Chicken meat (cooked)	0.5 kg
Oil cakes (gingelly)	1 kg
Black gram (cooked)	1 kg
Milk (steaming)	250 ml
Ghee (steaming)	100 g
Honey (added after cooling)	150 g
Blood (steaming)	250 ml

Incubation at 40°C for 40 days, total volume 5 l, mixed every alternate day

4. Evaluation of seeds obtained for germination capacity.

Observations

The observations regarding the survey of plant, analysis of soil, manuring and composition of modified *Kunapa jala* are shown in Tables 1–5.

Results

The results obtained by the experiments conducted on the growth of the plant by various treatments are shown in Tables 6–8.

Table 6: Effect on growth of plant (*G. superba* Linn.) by various treatments

Treatments	Parameters						
	Total length (cm)	No. of nodes	Inter nodal length (cm)	No. of leaves	Longest leaf (cm)	Broadest leaf (cm)	Average area (cm ²)
Control (n = 6)	54.42 ± 17.49	33.50 ± 12.33	4.29 ± 1.48	43.67 ± 11.07	13.83 ± 1.97	3.17 ± 0.33	14.5 ± 3.33
Chemical (n = 6)	74.50 ± 23.42	38.33 ± 10.74	2.59 ± 0.48	44.67 ± 10.73	16.17 ± 1.66	2.67 ± 0.40	13.11 ± 12.33
Vriksha-ayurveda (n = 6)	64.25 ± 28.18	57.67 ± 15.24	2.31 ± 1.70	54.75 ± 21.35	16.58 ± 1.70	3.67 ± 0.55	18.87 ± 4.65

Data are expressed as mean ± SEM

Table 7: Effect on growth of plant (*G. superba* Linn.) by various treatments

Treatment	Parameters				
	No. of branches	No. of flowers	No. of buds	No. of fruits	Others
Control (n = 6)	0.67 ± 0.42	0.00 ± 0.00	0.83 ± 0.65	0.00 ± 0.00	0.00 ± 0.00
Chemical (n = 6)	1.67 ± 1.12	0.67 ± 0.49	1.17 ± 0.98	0.00 ± 0.00	0.50 ± 0.22
Vriksha-ayurveda (n = 6)	0.83 ± 1.71	1.67 ± 2.48	1.33 ± 1.09	0.00 ± 0.00	0.00 ± 0.00

Data are expressed as mean ± SEM

Table 8: Assessment of reproduction capacity in term of yields of seeds in cultivated groups

Groups	Observations			
	Total wt. of seeds	No. of pods	Avg. no. of seeds/pod	% Fruition
Control (n = 5)	0.701 ± 0.16	3.00 ± 0.45	2.260 ± 0.66	71.43
Chemical (n = 3)	1.411 ± 0.71	5.00 ± 1.53	8.600 ± 4.80	100
Ayurveda (n = 7)	5.230 ± 1.29	7.714 ± 1.46	10.793 ± 2.59	100

Data are expressed as mean ± SEM

Discussion

Survey of natural habitat showed salient features in the total range of the assessed parameters.

The tables on growth regulator studies show that the tubers germinated by 3 weeks (average) and the seeds germinated by 3 months. The assessments show that treatment with thiourea gives a result almost equal to the result obtained in the tubers treated with honey and ghee and *Vidanga*. But reduction in number (*n*) makes one sure that the method of using thiourea is better. At the same time, treatment given with cow dung and ghee gives very good result on growth regulation. In overall comparison, cow dung and ghee treated groups have shown better effect as far as growth regulation is concerned in comparison with the chemical methods. The failure of control groups both in seed and tuber batches denotes that this plant needs some treatment for vegetative propagation under artificial conditions. On seed treatments, thiourea at various concentrations gives good result.

Assessment of lands by NPK status shows that the high concentration of nitrogen found in the plantation site may be due to the leaching of manure, especially chemical manure, from the adjacent area since the site was very near to a residential area.

Assessment of reproduction capacity in terms of yield of seeds in cultivated groups shows definite advantage among chemical and *Ayurveda* groups. Considering the number of pods and total weight of the seed reproduction capacity, *Ayurveda* group may be considered as a better one.

Conclusion

1. Planning, implementation and assessment of cultivation as per the procedures of *Vriksha-ayurveda* are possible.

2. Methods of *Vriksha-ayurveda* give good result in the case of *Langali* in terms of yield in comparison with the cultivated variety.
3. The yield of tuber was very high in natural plantation, showing the need for re-modification in the methods of cultivation.
4. Cow dung and ghee treated groups have an advantage as far as growth regulation is concerned in comparison with the chemical methods.
5. Failure of control groups both in seed and tuber batches denotes that *Langali* plant needs some treatment for vegetative propagation under artificial conditions.
6. Considering the number of pods and total weight of the seed reproduction capacity, *Ayurveda* group may be considered as a better one in the assessment of reproduction capacity in terms of yield of seeds.

References

1. Anonymous. Cultivation practices of some commercially important medicinal plants. New Delhi: National Medicinal Plant Board; 2002.
2. Anonymous - Science and Technology in Ancient India. Mumbai: Vijnana Bharati; 2002.
3. Verma A. Field Survey of Nationally occurring Medicinal Plants, PhD thesis, BHU, 1998.
4. Bavdekar H. Upavanavinoda: Chikitsa adhyaya- M Phil dissertation (Marati and Sanskrit)- Tilak Maharashtra Vidyapeetha; 1999.
5. Brodbeer. Seed Dormancy and Generation. In: Polackie, editor. U.S.A: Campoun & Hall; 1998.
6. Uniyal M. Bharat Mien Jadubutiyon ka Krushikaran. Patna: Baidyanath Ayurveda Samsthan; 1997.
7. Parasara. *Vriksha-ayurveda* of Parasara. In: Srikar NN, Srikar R, editors. Delhi: Sri Sadguru Publications; 1996.
8. Asha KV. Comparative Pharmacognostic And Pharmacologic Evaluation Of *Langali* (*Gloriosa Superba* Linn.) Under Wild And Cultivated Conditions – Ph.D. Thesis, I.P.G.T. & R.A. Jamnagar: Gujarat Ayurved University; 2005.

हिंदी सारांश

प्राकृतिक एवं अभ्यस्त परिस्थितिओं में लांगली (ग्लोरिओजा सुपर्बा) की वृद्धि शैली का अध्ययन

आशा के.वी., एन. राजशेखर, मालती चौहान, बी.रविशंकर, पी.पी.शर्मा

लांगली को प्राकृतिक, आधुनिक कृषि एवं वृक्षायुर्वेद निर्देशानुसार इन तीन परिस्थितिओं में विकसित करके अध्ययन किया गया। इस अध्ययन के अनुसार वृक्षायुर्वेद में वर्णित निर्देश ध्यान में रखते हुए विकसित लांगली का उत्पादन अधिक देखा गया।