Pharmacognostical Standardization

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

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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 pharmacists 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 Prasarana (400 BC), Arthashastra of Koutilya (300 BC), Brihat Samhita of Varaha Mihira (500 AD), Krisisukta of Kasyapa (800 AD), Vriksha-ayurveda of Surapala, etc., describe about the methods of cultivation of the plants.¹ ¹⁷

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

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

| Parameter                      | 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 peltied 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          | Ni-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               | *Mucuna*, *hibiscus*, *Bougainvillea*, *Clitoria*, wild G. Gram | *Grass*, *hibiscus*, *Tragia*, *Clitoria*, *Mucuna*, *Phaseolus* | *Tragia*, grass, bamboo, *Mucuna*, *hibiscus*, teak |

Alt: Alternate; Opp: Opposite

### Table 2: NPK analysis of soil

| Estimations          | pH | 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                  | 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             |
| Ayurveda                       | Kunapa jala   | Kunapa jala   | Cow’s urine, neem oil cakes |

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

### 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   |

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) | Brodest leaf (cm) | Average area (cm²) |
|--------------|-----------------------------------|-------------------|--------------|-------------------------|---------------|-------------------|-------------------|-------------------|
| 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 terms of yield of seeds in cultivated groups

| Groups   | Observations                             | Total wt. of seeds | No. of pods | Avg. no. of seeds/pod | % Fruition |
|----------|------------------------------------------|--------------------|-------------|------------------------|------------|
| Control  |                                          | 0.701 ± 0.16       | 3.00 ± 0.45  | 2.260 ± 0.66           | 71.43      |
| Chemical |                                          | 1.411 ± 0.71       | 5.00 ± 1.53  | 8.600 ± 4.80           | 100        |
| Ayurveda |                                          | 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 Langali 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.

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हिंदी सारांश

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

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