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Role of an Agro Technique for the Development of Medicinal Plant: *Shalparni*

Usha Kiran[*,a], G. B. Pawar [b], Vijay [c], Akanchha Thakur [d], J. C. Arya [e], B. Venkateshwarlu [f], M. Siddhamallayya [g], G. Babu [h], N. Srikant [i], R. N. Acharya [j]

[a] *Research Officer (Bot.), Central Ayurveda Research Institute (CARI), Jhansi-284003, India.*

[b] *Research Officer (Ay.), Central Ayurveda Research Institute (CARI), Jhansi-284003, India.*

[c] *Research Officer (Chem.), Central Ayurveda Research Institute (CARI), Jhansi-284003, India.*

[d] *Assistant Research Officer (Pharmacognosy), Central Ayurveda Research Institute (CARI), Jhansi-284003, India.*

[e] *Research Officer (Bot.), Central Ayurveda Research Institute (CARI), Jhansi-284003, India.*

[f] *Programme Officer (Bot.), Central Council for Research in Ayurvedic Sciences, (CCRAS), New Delhi, India.*

[g] *Nodal Officer (Bot.), Central Council for Research in Ayurvedic Sciences, (CCRAS), New Delhi, India.*

[h] *Assistant Director In-charge, Central Ayurveda Research Institute (CARI), Jhansi-284003, India.*

[i] *Deputy Director General, Central Council for Research in Ayurvedic Sciences, (CCRAS), New Delhi, India.*

[j] *Director General, Central Council for Research in Ayurvedic Sciences, (CCRAS), New Delhi, India.*

Abstract

Vrikshayurveda a classical science of botanical field, this science deals with growth and development of plants. This science mainly suggests uses of *Kunapa jala* and *Pancha gavya* for the high productivity of crops. This concept works around organic farming for effective plant growth. *Vrikshayurvedha* mentioned *Kunapajala* as organic liquid manure which is a fermentation product and acts as plant nutrients. There are two types of *Kunapajala* mainly in practices viz; herbal and non-herbal which is prepared according to the procedures described in *Vrikshayurvedha*. Considering importance of this we planned a study to investigate role of *Vrikshayurvedha* concept for the development of medicinal plant; *Shalparni.* Present study investigated role of *Kunapajala* in the growth and % yield of plant *Shalparni*. This study observed that *Kunapajala* treatment offered best response with respect to root yield and soil physico-chemical parameters. *Kunapajala* increased plant yield quantitatively as well as qualitatively.

Keywords: *Ayurveda, Kunapajala, Vrikshayurvedha, Shalparni*

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*Corresponding author

1. Introduction

Kunapa jala and *Pancha gavya* are nutrients used in botanical science which contains N, P and K contents. The literature evident that herbal and non-herbal *Kunapajala* offer appreciable response towards the growth and development of plant materials. *Kunapajala* acts as promising organic manure for the plant growth and yield. *Kunapajala* composed of fermentation of animal remains including flesh and marrow, etc. (1-3)

The flesh, blood and bone marrow, etc. of animals are mixed with water to prepare *Kunapajala.* Flesh of sheep, goat, cow dung and fish, etc. can be used along with other ingredients. *Kunapajala* improved soil fertility, plant growth and physico-chemical parameters, etc. The utilization of such nutrient increases biomass, shoot length, root length and overall yield of plant materials. *Kunapajala* alter soil fertility, increases nutrient holding capacity of surfaces and boost up the plant growth. (3-6)

2. Materials and Methods

The 250 gm seeds of medicinal plant *Shalparni* (*Desmodium gangeticum* (L.) DC. Collected from the Institute Garden in the month of October, 2019. Seed

was kept in air tight container with proper labelling.

Preparation of *Kunap-Jala* (7, 8)

1) Initial ingredients required for formulation washed and dried.
2) Water was added for decoction purpose, heated to boil and reduced the volume to one-eighth and transferred the flesh decoction to an earthen pot.
3) Stirred thoroughly while adding the *Go-dugdha*, powder of the sesame cake and honey in specified ratio to the prepared decoction of flesh was added.
4) Added separately boiled black gram (*Masha*), *Ghrita* and sufficient quantity of hot water to the earthen pot.
5) Sealed the mouth of the earthen pot and kept in warm place for 15 days.
6) The fermented material was filtered through muslin cloth, packed in air tight container and allowed for nourishing.

Table 1. Formulation composition

S. No.	Sanskrit or Local Name	Botanical /English Name	Part used	Quantity
1)	Kiti (Suvar)	Domestic pig (Sus scrofado mesticus)	Flesh	1 kg
2)	Matsya (Machhli)	Indian mackerel fish(Rastrelliger kanagurta)	Flesh	1kg
3)	Mesh (Bheda)	Domestic sheep (Ovisaries)	Flesh	1 kg
4)	Chhag (Bakari)	Domestic goat (Capra aegagrushircus)	Flesh	1 kg
5)	Neera (Water)	Portable water	-	64 lit
Reduced to				8 lit
6)	Go-dugdha	Cow's Milk	-	1 lit
7)	Khali	Sesamum cake (Sesamum indicum L.)	by-product of sesame oil extraction	500 gm
8)	Makshika (Madhu)	Honey	-	500gm
9)	Masha	Black gram (Vigna mungo (L.) Hepper)	Seed	500gm
10)	Go-ghrita	Ghee prepared from Cow's milk	-	250 gm
11)	Hot water			Qs

Sowing of Seeds (Germination):

Seeds of the plant (*Shalparni*) had sown in 15 kg capacity pots. Seed germination of the test plant was under observation during the period of growth of seeds.

Treatment by Manures:

KunapJal treatment was given to the experimental group of *Shalparni* after 60 days of plantation. Pots containing medicinal plant *Shalparni* grouped into three categories as follows:

- Control Group (Not received any nutrient)
- *Kunapjal* Group (Received *Kunapjal* 50 ml/pot)
- Farm yard Manure (These plant received FYM 5 gm/pot)

HPTLC analysis:

Test Solution

Coarsely powdered plant material of three groups was dissolved in 10 ml of methanol, sonicated for 10 min, centrifuged and the supernatant was taken for HPTLC analysis.

Mobile Phase

Toluene: Ethyl acetate: Methanol: Formic acid (6:4:2:1)

Marker compound present

Stigma sterol

Procedure

The 10 µl bands of test solutions were applied by 100 µL micro-syringe in different tracks on pre-coated silica gel $60F_{254}$ TLC plate of 0.2 mm uniform thickness using the applicator. Plates were developed in pre-saturated twin trough glass chamber with an optimized mobile phase at a distance of 8 cm.

The details of samples spotted on different tracks are as follows

- Track 1: Stigmasterol (Marker)
- Track 2: *Shalparni* (*KunapJal* group)
- Track 3: *Shalparni* (FYM group)
- Track 4: *Shalparni* (Control group)

Kunap jal analysis

The 250 ml sample of *Kunap Jal* was sent to the "Eko pro Engineers Pvt. Ltd." Laboratory, Ghaziabad, for the micronutrient analysis.

3. Results and Discussion

The germination of seeds was depicted in **Figure 1** which was found to be satisfactory.

Figure 1. Developing seeds of *Shalparni* (*Desmodium gangeticum)*

Inference of HPTLC Analysis:

The HPTLC data revealed presence of stigmasterol as chief phytoconstituents in *Shalparni* (**Figure 2**). Stigmasterol was visualized after derivatization with Anisaldehyde-Sulfuric acid reagent at R_f value of 0.682 in the specified mobile phase. It is evident from the R_f values and densitograms of derivatized plate that stigmasterol is present in all three samples of *Shalparni* i.e.; Control Group, *Kunapjal* Group and Farm yard Manure Group.

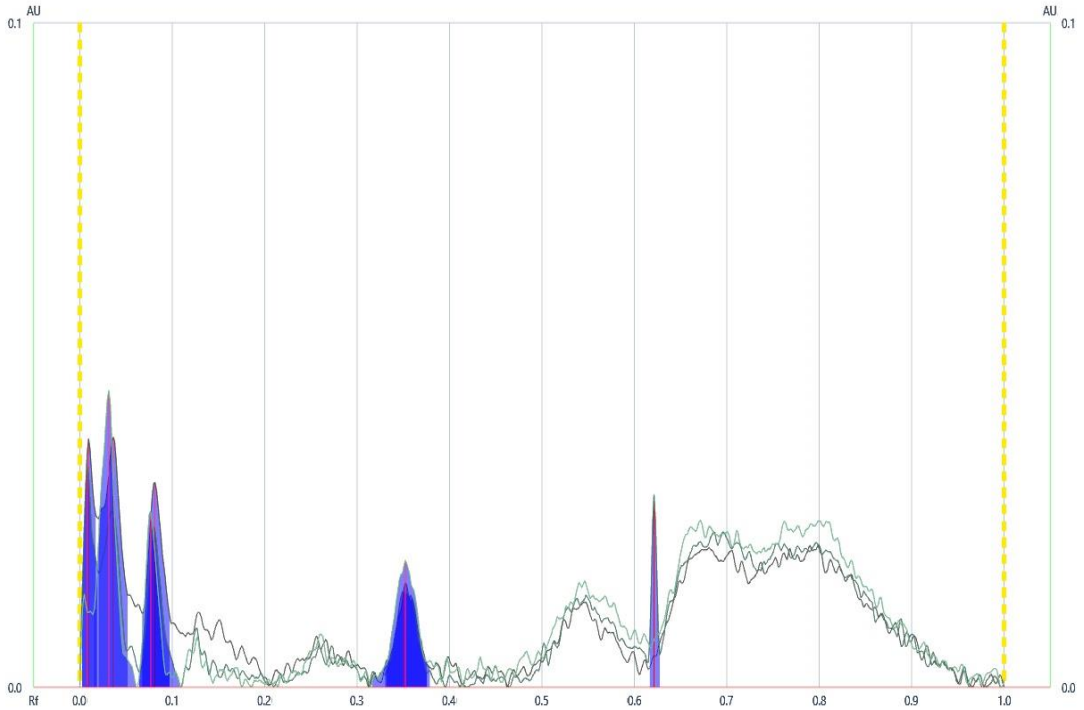


Figure 2. HPTLC 2D densitogarm of *Shalparni* at 254 nm

Results of Kunap Jal & Soil Analysis:

The findings of study suggested presence of nitrogen, phosphorous, sulfur, calcium, magnesium, zinc and copper, etc. in *Kunap Jal*, their % depicted in **Figure 3**. The presence of these components enhances fertilization of *Kunap Jal.* Similarly *Kunap Jal* alters physico-chemical parameters of soil which was observed in soil analysis as depicted in **Figure 4**.

The results of *Kunapjal* analysis showed high content of macro (NPK) and micro nutrients (Mg, Zn etc.) as well as higher Calcium content. *Shalparni* dry weight of root was 33.09 % non-significantly higher than the control in the *Kunapjal* treated plant; however it was 22.36 % higher than the FYM.

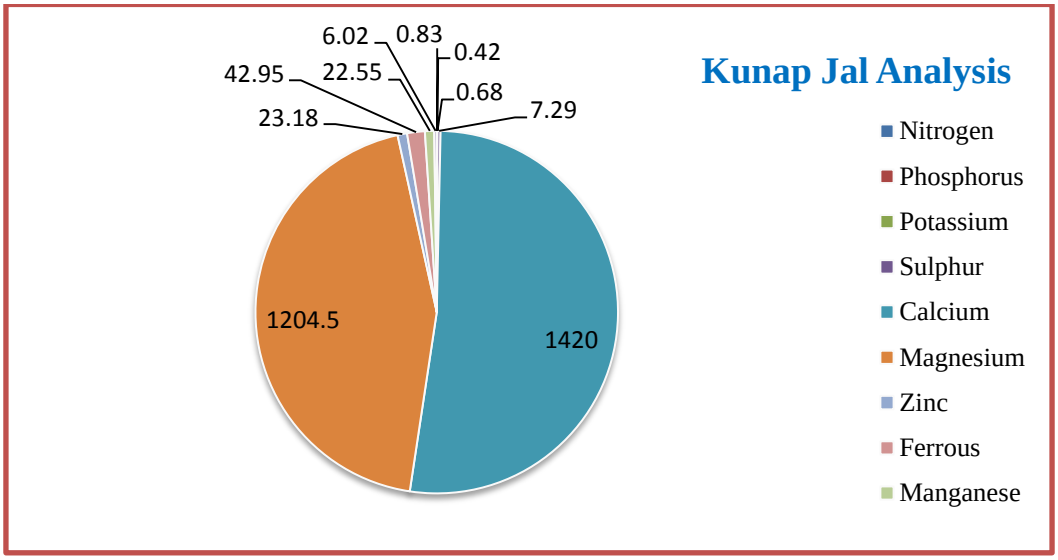
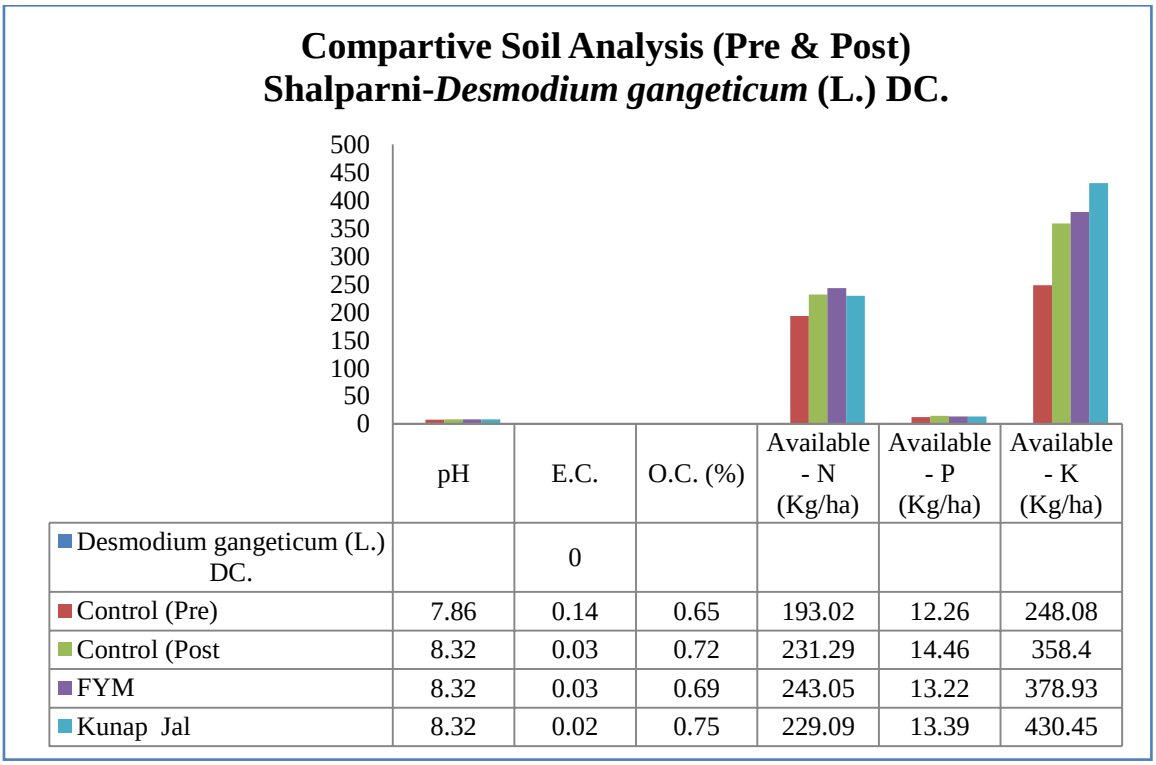


Figure 3. Composition of *Kunap Jal*



	pH	E.C.	O.C. (%)	Available - N (Kg/ha)	Available - P (Kg/ha)	Available - K (Kg/ha)
Desmodium gangeticum (L.) DC.		0				
Control (Pre)	7.86	0.14	0.65	193.02	12.26	248.08
Control (Post	8.32	0.03	0.72	231.29	14.46	358.4
FYM	8.32	0.03	0.69	243.05	13.22	378.93
Kunap Jal	8.32	0.02	0.75	229.09	13.39	430.45

Figure 4. Diagramatic representation of comparative soil analysis in experimental groups

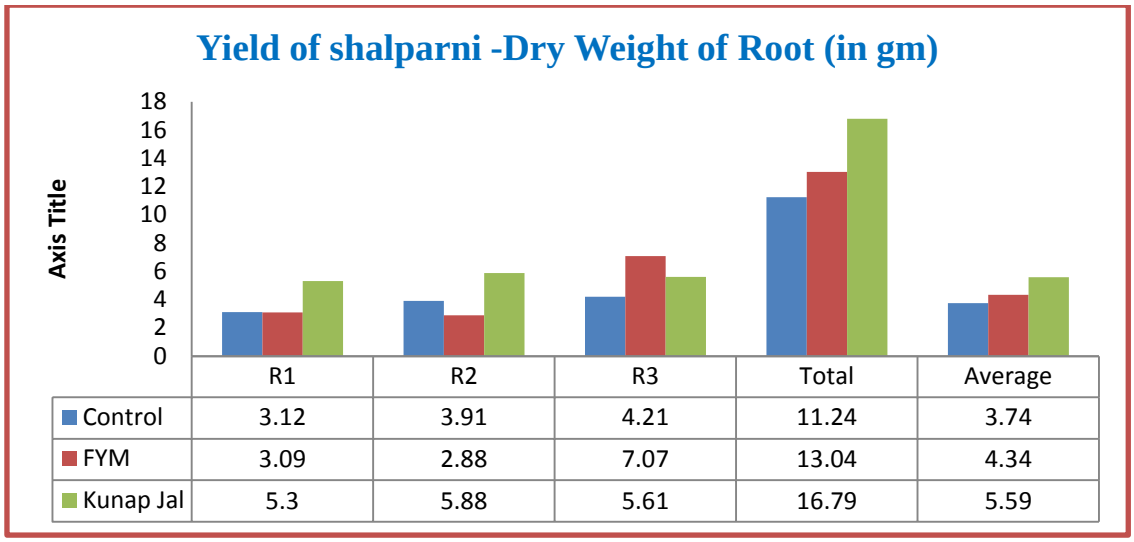
Physico-chemical analysis in post-harvest soil in *Shalparni* was done at IGFRI, Jhansi and the observations reported as follows:

- **pH:** It is same in all the three treatments.
- **Available-N:** It was non-significantly lower in the *Kunapjal* treated soil, which could have due to higher uptake of available Nitrogen by the plants resulting in better plants growth.
- **Available –P:** It was also non-significantly lower in case of *Kunapjal* treated soil, which could have due to higher uptake of available Phosphorus by the plants resulting in better plants growth.
- **Available-K:** It was non-significantly higher in case of *Kunapjal* treated soil, which could have due to higher amount of available –K in the soil treated with the *Kunapjal* (in the organic form) which could have mineralized resulting in to higher availability of Potassium which might have taken by the plants resulting in better plant growth.

Yield of Shalparni (Dry Weight of Root):

Dry weight of root was 33.09 % non-significantly higher than the Control in the *Kunapjal* treated plant; however, it was 22.36 % higher than the FYM (**Figure 5**). Higher % of yield in case of *KunapJal* could have due to rich organic matter content which could have

converted in the better nutrient rich soil results the higher uptake of the nutrients by the plant.



	R1	R2	R3	Total	Average
Control	3.12	3.91	4.21	11.24	3.74
FYM	3.09	2.88	7.07	13.04	4.34
Kunap Jal	5.3	5.88	5.61	16.79	5.59

Figure 5. Yield of *Shalparni* in dry weight of root (gm)

4. Conclusion:

KunapJal treatment exhibited best response amongst the three treatments with respect to root yield, post-harvest physico-chemical parameters of soil and presence of active constituent. Therefore it can be concluded from the study that *Kunapjal* can be used at par with FYM in seeding, germination and cultivation process of *Shalparni* (*Desmodium gangeticum)* (L.) DC. for increasing the quantitative as well as qualitative yield of plant. However present study also suggests a field trial to establish the technique.

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Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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