

Yield Studies of *Withania somnifera* (L. Dunal) in Reference to Vindhya Region

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Abstract: *The purpose of cultivation of medicinal plants is to get good return from the crop. The yield of Root, in Ashwagandha is the main purpose of growing this crop. The results shown for all the three varieties were good and the Poshita variety showed the best Root yield Production in the Vindhyan Region. The Net return was estimated for JA 20 was 1, 24,100 Rs/ha. For JA 134 was 1, 19, 500 Rs/ha and for Poshita, it was 1, 65,400 Rs/ha.*

Keywords: *Withania somnifera* (Ashwagandha), JA-20, JA 134 and Poshita (varieties of Ashwagandha), JNKVJ (Jawaharlal Nehru Krishi Vishwavidyalaya Jabalpur), Net return (return on investment)

I. INTRODUCTION

Needs of Ayurvedic medicines have been jumped in the covid -19 scenario. The world wide positive faith developed in the Indian medicinal drugs i.e. Ayurvedas. Our most valuable heritage is the Ayurveda. Ayurveda is in daily life of thousands of Indians. Since morning to late night number of spices and herbs played vital role in domestic and aesthetic life of Indians. Since the existence of Bharat varsa (India) our forefathers have explained, practiced and kept faith in Ayurvedic drugs. When the whole world was singing the song of benefits of Allopathic medicines, India kept the patience and continued thousands of experiments upon medicinal plants.

Among the various medicinal plants, Ashwagandha is an important medicinal plant and it is used in Ayurvedic, Siddha, Tibetan and Unani extends back over 3000 to 4000 years (B.C.) (Atal and Schwarting, 1961). About 75% of herbal requirement is met through wild collections, currently (Anonymous, 2001). While the demand for medicinal plants are increasing. Due to the growing awareness about side effects and complications of chemical and synthetic medicines, cosmetics and health supplements, uses of herbal products has gain importance both in the Western and Eastern worlds. The global market of herbal medicines is about 82 billion US Dollar per annum and India's share is only about 0.2 %. We hope that the market for India will grow up to about 15% in near future.

II. MEDICINAL CROPS GROWN IN VINDHYA REGION, MADHYA PRADESH

There is wide scope for adoption of these crops. Medicinal and aromatic plant diversity of Madhya Pradesh is very rich with its prosperous indigenous drug system particularly prevalent among tribal. Madhya Pradesh had an area of 18364 hectare with production 110184 tonnes under medicinal and aromatic crops. (2003) There is a significant contribution of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur in the field of bio-diversity conservation, and documentation of medicinal plants and indigenous Medicare prevalent among natives of Madhya Pradesh. The university developed agro techniques (package of practices) for cultivation medicinal (bach, muskdana, **ashwagandha**, Isabgol, sarpagandha, kalmegh, curcuma and safed musli) and aromatic (mentha, lemongrass, palmarossa, vetiver, german chameli, guggul, and eucalyptus) plants. The university developed a nursery for multiplication of seed /planting materials. About 100 species are available in the nursery for sale. During 1998-99 the seed and planting material of worth Rs. 1.87 lakh has been sold to the farmers and different organizations. In university more than 1000 plants species have been collected from the forests of Madhya Pradesh and conserved in herbal garden. The valuable species also procured from the various parts of the India. The Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur has been identified as Centre of Excellence for niche area of medicinal and aromatic plants by Indian Council of Agricultural Research, New delhi.

III. METHODOLOGY

3.1 Cost Cultivation of Ashwagandha (Technical Parameters)

1	Variety	Jawahar/Poshita
2	Spacing	30 cm x 30 cm
3	Plant population	110,000 / ha
4	Seed-rate;-Broadcasting-method	7,kg/ha
5	Yield Estimated (kg/ha) 1. Dry root 2. Seeds	1. JA 20-7.0 q/ha. 2. JA 134- 6.8 q/ha. 3. Poshita 9.2 q/ha. 1. JA 20-154kg./ha. 2. JA 134-150kg./ha. 3. Poshita-216kg./ha.

	Items	(Rs.)
1	Cost of seeds / kg	300.00 for JA 20 and JA 134 and 2000.00 for Poshita.
2	FYM cost / tone	1000.00
3	Wage rate / manday	200.00
4	Sale-price/kg (i) Seeds ii) Roots	150.00* 200.00*

- Seed available at the JNKVV(seed counter) at the Rate of 300 Rs/kg. for JA 20 and JA134 and 2000 Rs/kg. for Poshita.
- Selling price of Seed and Root at market is about 150 to 200 Rs./kg.
- Unit Size : 1.0 ha. (Figs. in Rs.)
- Data given are calculated in the year of 2011-2012

3.2 Cost Cultivation of Ashwagandha (Natural Condition)

Unit Size: 1.0 ha. (Figs. in Rs.)

	Items	Cost
I.	MATERIALS COST :	
1	Seeds (7 kg./ha)	2100 for JA 20 and JA 134. 14,000 for Poshita.
2	FYM / cow dung manure	10,000
3	Seed treatment chemicals	300
	TOTAL (I)	12400/24,300
II.	LABOUR COST :	
1	Land preparation	6000
2	Application of manures / biofertilisers	1000
3	Irrigation	1,200
4	Interculture	1,000
5	Harvesting berries, crushing to take out seeds, digging roots, washing, cutting into pieces, drying berries and roots, grading, storing, packing, etc.	7,200
	TOTAL (II)	16400
	GRAND TOTAL (I+ II)	28800/40,700
	Approx.	29,000/ 41,000
	Cost for JA 20 =	29,000
	Cost for JA 134 =	29,000
	Cost for Poshita =	41,000



Land Rent/ Cost = 10,000 Rs./ha.

Total Value

For JA 20 = 39,000* Rs.

For JA 134 = 39,000* Rs.

For Poshita = 51,000* Rs.

IV. CROP PRODUCTIVITY

Maturity days for JA20 *Withania somnifera* varies from 164 to 168 days, for JA 20 *Withania somnifera*. It varies from 165 to 167 days for JA134 and for Poshita variety of *Withania somnifera* maturity varies from 169 to 172 days.

Root yield is an important aim of growing *Withania somnifera*, Mainly Root is obtained from this plant for medicinal purposes "Withanoid" is the alkaloid which is obtained from the root and used in different medicines. The Name of plant "Withania" is due to this "Withanoid" alkaloid. For JA 20, Root yield ranges from 6.8 to 7.0 quintal per hectare, For JA 134; It ranges from 6.4 to 6.8 quintal per hectare and for Poshita variety of *Withania somnifera* it ranges from 7.8 to 9.2 quintal per hectare. The Highest Root yield is obtained from Poshita variety of *Withania somnifera*.

Seed is an important requirement for growing the crop. It also denotes the Production of crop, which is important in terms of market prices and economy to the plant growers. Seed yield for the JA 20, *Withania somnifera* ranges from 145 to 154 kg/ha., For JA 134 *Withania somnifera* ranges from 142 to 150 kg/ha. The highest seed production obtained from the Poshita variety of *Withania somnifera* ranges 206 to 216 kg/ha.

4.1 Yield on Natural Condition**The Maximum Root Yield was calculated**

For - JA 20 = 7.0 q/ha.

For - JA 134 = 6.8 q/ha.

For - Poshita = 9.2 q/ha.

The maximum seed yield was calculated --

For - JA 20 = 154 kg/ha.

For - JA 134 = 150 kg/ha.

For- Poshita= 216 kg/ha

4.2 Cost – Benefit Analysis**A. Gross Return for JA 20:**

*Cost of cultivation Estimated = 39,000 Rs/ha.

(i) Dry Root 1 kg. @ 200 Rs.

Total dry root production = 7.0 quintal per hectare.

7.0 quintal = 700 kg., = 700 x 200 = 1,40,000.00 Rs.

(ii) Seeds 1 kg. @ 150 Rs.

Total Seed Production = 154 kg. per hectare.

154 kg. = 154 x 150 = 23,100 Rs.

Gross return = 1,40,000 + 23,100 = 1,63,100 Rs.

B. Net Return = Gross Return – Cost of Cultivation.

Net Return = 1,63,100 – 39,000 = 1,24,100 Rs.

Net Return = 1,24,100 Rs.

C. Cost Benefit Ratio = 1: Gross Return / cost of Cultivation.

1,24,100 Rs./ 39000 = 1:3.18

So, the Cost-Benefit Ratio for the cultivation of JA 20, *Withania somnifera* is 1:3.18. It means on investment of 1 Rs. We will get 3 Rupees 18 paise.

D. Gross Return for JA 134:

*Cost of cultivation Estimated = 39,000 Rs/ha.

(i) Dry Root 1 kg. @ 200 Rs.

Total dry root production = 6.8 quintal per hectare.

6.8 quintal = 680 kg., 680 x 200 = 1,36,000.00 Rs.

(ii) Seeds 1 kg. @ 150 Rs.

Total Seed Production = 150 kg. per hectare.

150 kg. = 150 x 150 = 22,500 Rs.

Gross return = 1,36,000 + 22,500 = 1,58,500 Rs.

E. Net Return = Gross Return – Cost of Cultivation.

Net Return = 1,58,500 – 39,000 = 1,19,500 Rs.

Net Return = 1,19,500 Rs.

F. Cost Benefit Ratio = 1: Gross Return/ cost of Cultivation.

1,19,500 Rs./ 3900 = 1:3.06

So, the Cost-Benefit Ratio for the cultivation of JA 20, *Withania somnifera* is 1:3.06, It means on investment of 1 Rs. We will get 3 Rupees 06 paise.

G. Gross Return for Poshita

*Cost of cultivation Estimated = 51,000 Rs. (1kg seed cost 2000 Rs.)

(i) Dry Root 1 kg. @ 200 Rs.

Total dry root production = 9.2 quintal per hectare.

9.2 quintal = 920 kg., 920 x 200 = 1,84,000.00 Rs.

(ii) Seeds 1 kg. @ 150 Rs.

Total Seed Production = 150 kg. per hectare.

216 kg. = 216 x 150 = 32,400 Rs.

Gross return = 1,84,000 + 32,400 = 2,16,400 Rs.

H. Net Return = Gross Return – Cost of Cultivation.

Net Return = 2,16,400 – 51,000 = 1,65,400 Rs.

Net Return 1,65,400 Rs.

I. Cost Benefit Ratio = 1: Gross Return/ cost of Cultivation.

1,65,400 Rs./ 51,000 = 1:3.24

So, the Cost-Benefit Ratio for the cultivation of JA 20, *Withania somnifera* is 1:3.24, It means on investment of 1 Rs. We will get 3 Rupees 24 paise.

V. SUMMARY

Madhya Pradesh a leading state in commercial cultivation and trade of many medicinal and aromatic plants specially Ashwagandha, Sarpagandha, Bach, Isabgol, Safed Musli, Muskdana, Rosha grass, Leman grass, Khurasani ajwain, sadabahar, Chandrasur, Chitraik and opium. The state having mega bio-diversity and 11 agro-climatic regions, which caters the large varieties of medicinal and aromatic crops.

Estimation of economics and cost benefit ratio of the different varieties of *Withania somnifera*, shows all the three varieties of *Withania somnifera* farmers can get three times benefit. Now, it depends on farmer's choice that what type of seed and expenses they want. The price of seed for JA 20 and JA 134 are Rs 300/kg. but for Poshita seed price are Rs. 2000/kg. Overall economics shows that the net return from the Poshita variety were high in Vindhyan Region.

The economics for these three varieties i.e. JA 20, JA 134 and Poshita were calculated as follows-

For JA 20: one Rupee investment gives Rs 3.18, for JA 134, one rupee investment gives Rs 3.06 and for Poshita variety of *Withania somnifera* one rupee gives Rs 3.24. The Net return was estimated for JA 20 was 1, 24,100 Rs/ha. For JA 134 was 1, 19, 500 Rs/ha and for Poshita, it was 1, 65,400 Rs/ha.

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