

Diversity of Ashwagandha (*Withania somnifera* Dunal): An exploration of its varieties

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ABSTRACT: In current era of globalisation, increased demand of raw Ayurvedic herbs is being fulfilled through various developed varieties of herbs. The powerful herb Ashwagandha (*Withania somnifera* Dunal) – The Indian Ginseng is one among them, which is being provided to the market through its various developed-cultivated varieties. Some varieties of Ashwagandha are Jawahar Ashwagandha- 134, Gujarat Anand Ashwagandha-1, Raj Vijay Ashwagandha-100 etc. There are several concepts behind creating these varieties such as increased yield of plant part used, increased quantity of major chemical constituents, early maturity etc. Here, various varieties of Ashwagandha are being discussed along with their rationality of development.

KEYWORDS: Ashwagandha, Medicinal plant varieties, *Withania somnifera*

I. INTRODUCTION

In Ayurvedic compendia enormous medicinal plants are mentioned. Demand for a genuine raw plant material is increasing with growth in human needs, numbers and commercial trade. To satisfy the regional and international markets, the plant sources are being explored at local, regional and international places and are harvested in increasing amount to supply at various platforms. The ongoing growing pattern of recognition on medicinal plants is due to several reasons, including escalating faith in herbal medicine as conventional medical system couldn't cover wide range of diseases. Moreover, its high prices and side-effects are also causing many needy to return to herbal medicines which have fewer side effects and cost. The instant rising demand of

plant-based drugs is unfortunately creating heavy pressure on some selected high-value medicinal plant populations in the wild due to over-harvesting.

To combat increased burden for demand of medicinal plants agriculture universities, NMPB, various forest acts policy help to maintain plant population through sustained harvesting, increased plants plantation and farmers awareness. Along with all these measures creation of plants varieties are also being supported through using genetic modification, tissue culture, cross pollination, selection methods etc. These methods help in creating various varieties of medicinal plants. Medicinal plants varieties are being developed to improve various factors of plants such as, higher yield, disease resistance, flood resistance, early to mature, insect and pest resistance etc.

Ashwagandha, one among the potent Ayurvedic herb being widely used in several sectors like pharmaceuticals, cosmeceuticals, nutraceuticals, other confectionary items, etc. In Madhya Pradesh alone it is cultivated in more than 5000 hectare. The estimated production of Ashwagandha roots in India is more than 1500 tonnes and the annual requirement is about 7000 tonnes necessitating the increase in its cultivation and higher production. This plant was widely available in the wild prior. But, since last few years varieties of it are being developed to provide various benefits.

II. MATERIAL AND METHOD

Wide range of articles were reviewed regarding varieties of Ashwagandha and their

passport data. Information was gathered, analysed, segregated, tabulated over here.

III. OBSERVATION AND RESULT

Various information was achieved about Ashwagandha varieties, viz. method of

development of variety, university-year of creation of variety, yield of root/leaf, quantification of active ingredients, morphological characteristics, maturity period, reason of development etc. All these data are tabulated below:

Table No. 1: Details about varieties of Ashwagandha

1. Christen as cv. CIMAP Pratap		
1.	University & Year of creation	CSIR-CIMAP in 2011
2.	Method of Development	Half-sib selection
3.	Yield	High dry root yield of 34.95 ql/ ha, high fresh and dry leaf yields of 5.39 and 0.87 ql/ha.
4.	Active Ingredients	High total withanolide content of 0.31% in roots, and high withaferin-A content of 0.720% in the dry leaves.
5.	Characteristics	It is a tall type (plant height 180.00cm) having dark green leaves (142B) of the size 8.10cm (average of three upper, medium, and lower leaves in main branch). The variety is also characterized by green stem (RHS139D) with red berries (RHS79D).
6.	Other	-
2. Poshita		
1.	University & Year of creation	CSIR-CIMAP in 2001
2.	Method of Development	Half-sib selection
3.	Yield	Dry root yield of 14 q/ha, fresh and dry leaf yields are also high up to 2.83 and 0.50 q/ha.
4.	Active Ingredients	Total alkaloids and withanolide content (steroidal lactones) which are the major group of secondary metabolites of medicinal interest containing 1.292 and 3.469 kg/ha respectively.
5.	Characteristics	It is medium tall, semi broad, medium dark colour leaf with red-coloured berries.
6.	Other	The variety developed by CSIR-CIMAP is presently grown in about 3000 ha of land due to the continued efforts made by CIMAP Research Centre, Hyderabad, under the institute's rural development programme. This variety is very popular in South India specially Anantnag.
3. NMITLI-11		
1.	University & Year of creation	CSIR-CIMAP and NBRI in September 2009.
2.	Method of Development	-
3.	Yield	The variety is reported to give dry root yield of about 15 q/ha.
4.	Active Ingredients	It has withanolide-A and withanone in roots and high content of withaferin-A (up to 2%) and no withanone in leaves.
5.	Characteristics	The variety has uniform crop canopy, non-spreading plant architecture (more plant/unit area).
6.	Other	High root yield and high withanolide yield per unit biomass, and phytochemically uniform and is the first pharmacologically validated variety.
4. NMITLI-101		

1.	University & Year of creation	2015
2.	Method of Development	-
3.	Yield	Up to 23 q dry roots under optimal agronomic condition.
4.	Active Ingredients	-
5.	Characteristics	-
6.	Other	-
5. Jawahar Ashwagandha-134		
1.	University & Year of creation	College of Horticulture, Mandsaur, JNKVV, Jabalpur, Madhya Pradesh, during the year 1998.
2.	Method of Development	Pedigree selection method. It is selection from JA-20 and wild types of Ashwagandha.
3.	Yield	Average dry root yield is about 4 to 6 q/ha.
4.	Active Ingredients	-
5.	Characteristics	JA-134 is erect, tall and leaf is chordates, dark green colour, surface is hairy, berries are yellow or yellowish brown.
6.	Other	It takes about 150 - 175 days for maturity
6. CIMAP Chetak (Naguriwithania variety)		
1.	University & Year of creation	CSIR-CIMAP in 2011
2.	Method of Development	Half-sib family selection
3.	Yield	High dry root yield of 11.77 ql/ha, fresh and dry leaf yield was also high 1.722 and 0.453 ql/ha respectively.
4.	Active Ingredients	High total withanolide content 0.40% in roots. With high withaferin content 1.223% in leaves.
5.	Characteristics	It is a semi vigorous, medium green small leaves size and whitish green stem.
6.	Other	-
7. Gujarat Anand Ashwagandha-1		
1.	University & Year of creation	Medicinal & Aromatic Plants Research Station, Anand Agricultural University, Anand, Gujarat in the year 2015.
2.	Method of Development	-
3.	Yield	Average yield of dry roots is 650 kg/ha.
4.	Active Ingredients	-
5.	Characteristics	It is tall and has dark green foliage colour. The branches possess profusely stellate tomentose. The roots are dark brown in colour and comparatively thick, long and having more girth. Special features are that the root cortex is white in colour and thick. The calyx is bigger.
6.	Other	-
8. Jawahar Aagand-20		
1.	University & Year of creation	MAP unit, College of Horticulture, RVSKVV, Mandsaur, Madhya Pradesh.
2.	Method of Development	-
3.	Yield	Dry root yield 5-6 q per hectare.
4.	Active Ingredients	-
5.	Characteristics	-
6.	Other	-
9. Raj Vijay Ashwagandha-100		
1.	University & Year of creation	MAP unit, College of Horticulture, RVSKVV,

		Mandsaur, Madhya Pradesh.
2.	Method of Development	-
3.	Yield	Dry root yield 6-7 q/ha.
4.	Active Ingredients	-
5.	Characteristics	-
6.	Other	-
10. DWS 327 - A dwarf pure line of Ashwagandha		
1.	University & Year of creation	Directorate of Medicinal and Aromatic Plant Research (DMAPR) (ICAR), Boriavi, Anand, Gujarat.
2.	Method of Development	-
3.	Yield	-
4.	Active Ingredients	Withanolide-A content (>1.75 mg g ⁻¹ dry weight)
5.	Characteristics	Having plant height less than 30 cm, decumbent type stem, few branches from the base, branch position-acrocaulous, branch arrangement- less divergent, leaf orientation – geniculate, light green leaves, short lamina length, narrow lamina width, elliptic shape leaf, oblique leaf base, leaf margin is undulate-less wavy, obtuse leaf apex, less hairy lamina surface, midrib surface less hairy, short stem inter nodes length, less hairy stem surface, short pedicel length, pale yellow flower, yellow colour berry.
6.	Other	It has been registered for its dwarf plant type (<30 cm) by the National Bureau of Plant Genetic Resources (NBPGR) New Delhi (INGR 11026: IC 0588697) as useful germplasm for utilization in the Ashwagandha breeding programme.

IV. DISCUSSION

As the demand of Ayurvedic medical science is increasing in world's population, the raw Ayurvedic herbs' demand is also increasing. To fulfil these much of need with quantitative and qualitative level, plants varieties are being developed very rapidly.

Ashwagandha is one of the Ayurvedic herb, which is widely used in clinical practice. To fulfil its demand in medicinal purpose, its varieties are being developed and explored. Most of the varieties of Ashwagandha are being developed through half-sib selection and pedigree selection method. Among development of various varieties of Ashwagandha there are some basic criteria to achieve good quality crop. These are – High yield of roots and leaves, high quantity of major chemical constituents like withanolides, withaferin A, withanone, to achieve uniform crop canopy (More plant/ unit area) (Ex. NIMITLI-11). Among various varieties of Ashwagandha NIMITLI-11 named developed variety is claimed to be pharmacologically validated variety.

Though roots are the useful parts of Ashwagandha as per ancient Ayurvedic science,

but high quantity of major chemical constituent withaferin-A is being checked and focused in its leaves in several developed varieties.

To have quality of the crop, various criteria were decided and planned, subject to comply the pattern of demand by purchaser. However, the criteria for a conceptual Ayurvedic medicinal plant are not observed to be followed in current system. Most of the criteria were based on the yield of crop, availability of specific active ingredient, geographical development, short period yield, etc.

Increased yield is the most prime objective and is achieved by developing more efficient genotypes. However, by doing so, the overall Ayurvedic quality and clinical efficacy in the end-users needs to be assessed. On the other side, to improve the quality in the form of aroma, appearance, protein content, essential oil, amino acids and other active compositions etc. should be checked for effect mentioned in the Ayurvedic / traditional documents.

It is well known that by altering the specific active composition in a crop, may not give desirable clinical effect mentioned in the old texts.

The ideology is of ‘drug-as-a- whole’ and not a ‘single-entity’ based.

Though various plant varieties are being developed on large scale, but sometimes the claim of possessing their novelty and usefulness even after long decades is not being maintained due to various factors knowingly or unknowingly as – agro-techniques, climate, geological differences, season, soil, soil nourishment, fertilisers, pesticides etc. In those cases, plant varieties may differ in their qualities.

The ultimate goal of any medicinal plant should be the effective clinical management, it should not depend only some quantitative data like yield or chemical compound quantification etc. As these data are not permanent for any varieties with above mentioned changes. So, plant varieties should be checked timely on clinical basis.

Acharya Charaka has described Aushadha Pariksha elaborately, which seems to be very scientific and perfect. In today’s era, when the medicinal plants varieties are being exaggeratedly developed, we must apply this Aushadha Pariksha to validate new varieties on the basis of Ayurvedic parameters.

V. CONCLUSION

Various varieties of plants are being developed and released primarily to gain market fame and financial benefits along with other above-mentioned reasons. Ashwagandha is one among them, being explored for varieties development for high yield, higher chemical compound concentration etc. All the claims of varieties development should be proceeded from various Ayurvedic parameters and ultimate clinical studies. This can help in analysing plant varieties for its wide applications.

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