Int. J. Ayur. Pharma Research, 2015;3(1):46-51 **ISSN: 2322 - 0910**

International Journal of Ayurveda and Pharma Research

Research Article

PHARMACOGNOSTICAL EVALUATION OF NAGAKESARA USED IN DIFFERENT PARTS OF INDIA

Chaubey Suresh[1*], Tewari Ramesh Chandra[2], Kurele Rajeev[3], Kotecha Meeta[4], Kour Gagan Deep[5]

[*1]Assisstant Professor, [5]P.G. Scholar, P.G. Dept. of Dravyaguna, Rishikul State PG Ayurvedic College and Hospital, Haridwar, Uttarakhand, India.

[2]Assisstant Professor, Dept. of Agad Tantra, Rishikul State P.G. Ayurvedic College and Hospital, Haridwar, Uttarakhand, India.

[3]Manager QC, QA and F & D, Person-In-charge, AYUSH DTL (Govt. Approved Lab), Indian Medicines Pharmaceutical Corporation Limited, Mohan, Distt. Almora, Uttarakhand, India.

[4]Professor & HOD, P.G. Dept. of Dravyaguna, National Institute of Ayurveda, Jaipur, India.

Received on: 25/12/2014 Revised on: 12/01/2015 Accepted on: 25/01/2015

ABSTRACT

Nagakesara though have no mentioning in Vedic literature is a widely mentioned drug in the *Ayurvedic* classics both in *Brihattrayees* and *Laghutrayees*. In *Nighantukaala Nagakesara* included in almost all *Nighantus* which mentions its prime importance and wide utility in therapeutics especially in disorders of GIT, skin and bleeding disorders. It has more than 20 synonyms. Modern literature mentions its considerable role in bleeding disorders and explanation regarding its morphological characters, habitat, chemical composition, characters and action. There is a need to study the position of *Nagakesara* in the crude drug market. It was found that there is a lot of confusion regarding the acceptance of genuine drug under the name *Nagakesara*. As there is scarcity and unavailability of *Nagkeshara*, also due to lack of awareness, instead of *Nagkeshara*, the *Pratinidhidravya* like *Surpunnag, Punnag, Tamalpatra* are used commonly. And gradually the use of real *Nagkesara* is diminished and the Ayurvedic Vaidya, teachers and students also understood the *Pratinidhidravyas* of it as real *Nagkeshara.*

KEYWORDS: *Nagakesara, Mesua ferrea* Linn.*, Ochrocarpus longifolius* B & H*, Callophyllum inophyllum* Linn.*, Dillenia pentagyna* Roxb*, Cinnamomum wightii* Meissn.

INTRODUCTION

There is a huge surge on *Ayurvedic* plants in the planet and it has become a subject of intensive research for various aspects. There have also been substantial efforts to standardize the *Ayurvedic* crude drugs as well as finished *Ayurvedic* medicines. However, these initiatives would imperatively need establishing correct identity of the plant drug. The long history of safe usage of *Ayurvedic* medicines can be extrapolated only when the botanical identity of the plant going into those medicines is established and standardized. Hence proper nomenclature of all crude drugs and establishing their exact botanical origin is a must.[1]. Even a physician well versed with the identification of green drug and laboratory based Phyto-chemical methods to assess the authenticity finds it difficult practically to test the genuineness of the raw materials while procuring from the market due to lack of guidelines. The modern methods like microscopy, chemical assay etc. are the methods that require trained persons and well equipped laboratories that are not available to common physician. Further these can be done only to verify the authenticity of the already procured drugs. Among the vast varieties of Ayurvedic drugs, the *Nagakesara* is a popular drug which is a tree of tropical Asia. The real *Nagakesara* is called *Mesua ferrea* Linn. which belongs to family Guttifereae. *Kesara* in Sanskrit means pollens. So stamens, pollens or whole flower of this tree is to be used in medicine. This is the real *Naga champaka*.[2] The flowers are said to be astringent, stomachic, expectorant and useful in bleeding piles, the flower buds are used in dysentery. *Nagakesara* helps in digesting the undigested food, cures fever, itching, thirst, excess perspiration, vomiting, nausea, bad smell, skin diseases, herpes, diseases of *Kapha, Pitta* and alleviates *Visha*.[3] But as there is scarcity and unavailability of *Nagkesara*, also due to lack of awareness; instead of *Nagkesara*, the *Pratinidhidravya* like *Surpunnag, Punnag, Tamalapatra* are used commonly.[4] *Nagakesara* is mostly attributed to the stamens or the flowers of

Mesua ferrea Linn. of the family *Guttiferae*. (Dymock 1885, Kirtiker and Basu B. D. 1918, Nadkarni K. M. 1908, Chopra, R. N. 1956, Chunekar. K. C. 1969). Recently the usage of dried fruiting inflorescence of *Cinnamomum wightii* Meissn of the family *Lauraceace* and dried fruits of *Dillenia pentagyna* Roxb of the family *Dilleniaceae* has been reported (Usman. S. Ali 1967). Therefore there is an urgent need to evolve exclusive identifying features of raw drugs by organo-leptic methods along with the Phyto-chemical analysis so as to serve as a ready reference for all physicians in identification of genuine medicinal plant raw materials.[5]

VARIOUS SPECIES SOLD UNDER *NAGAKESARA*

***Mesua ferrea* Linn.**

Mesua ferrea Linn. belonging to family *Guttiferae* is a source of *Nagakesara*. Useful part is stamen. It is a middle sized, glabrous tree, trunk is straight, erect smooth bark which is ash-coloured, young branches are twiggy, slender. Leaves are 7.5 - 12.5 by 2.5 - 3.8 cm oblong lanceolate, acute or acuminate, red when young, afterwards shinging above, glaucous and pruinose, beneath rounded or acute at the base and with close, inconspicuous nerves, petioles are 6-8 mm long. Flowers are very fragrant, 2.5 - 7.5 cm. in diameter, axillary or terminal, solitary or in pairs, subsessilemhunds, subglobose, bracts. Sepals are 4, orbicular, cupped, puberulous outside, presistent, the inner pair much longer than the outer, Petals are 4, pure white, Spreading, obovate undulate, with crisped and undulate margins, often torn. Stamens are verynumerous, golden yellow, much shorter than the petals, slightly united at the base into a fleshy ring, anthers are oblong. Style is twice as long as the stamens, stigma is peltate. Fruits are 2.5 - 3cm. long, ovoid with a conical point, surrounded by the enlarged sepals, pericarp is tough, semi-woody, at length 2-valved. Seeds are 1-4 angular, smooth, chestnut brown. *Mesua ferrea* Linn. is commonly distributed in mountains of East Himalaya and East Bengal, Assam, Tenasserim, Burma, Andamans, evergreen rain forests of North Karnataka, Western Ghats from South Karnataka to Travancore, upto 5,000 feet.[6],[7]

***Ochrocarpus longifolius* Benth & Hook**

It also belongs to family *Guttiferrae*. Part used is dried floral bud. *Ochrocarpus longifolius* Benth. & Hook is a big tree with very pretty and glossy foliage. Young shoots are slightly 4 gonous. Leaves are thickly coriaceous, 15-20 by 5-6.3cm, oblong, obtuse margins and prominent midrib, base is round, veins inconspicuous in fresh, but beautifully reticulate in dried specimens; petiole is 6 mm. long, stout. Tiny flowers are borne in clusters on the tree trunk and mature branches. Flowers have a very pleasant scent, which lasts even when the flowers dry up. The flowers appear in the hot weather and the fruits ripen during the rainy season. Flowers are numerous, in short fascicles on tubercles from the axils of fallen leaves; buds globose, apiculate, orange-red; pedicels 1.2-2 cm. long 2 valves, reflexed during flowering. Petals are 4, ovate-oblong, acute, thin, deciduous, white streaked with red. Stamens are many, sterile in the female flowers. Style is short, stout; stigma is broad, peltate. Fruits are 2.5 cm. long, obliquely ovoid, tipped by the hard, pointed style, 1-seeded. *Ochrocarpus longifolius* Benth. & Hook is commonly distributed in Western Ghats of the Konkan, Northern Kanara, Malabar and Coimbatore and cultivated in the Northern Circars[8],[9] The flowers of *Lal Nagakesara* are fragrant, sweet, cooling, analgesic, stomachic, aphrodisiac; pacifies *Kapha*, dispel biliousness; good in blood diseases, leprosy etc. It is a tonic for heart, is antispasmodic, diuretic and emmenagogue. It exhibits significant anti-inflammatory and styptic activity. Main uses has been described in leucorrhoea and for controlling bleeding in menorrhagia and piles. Its use in menorrhagia may be due to its action on capillaries. Also useful in metrorrhagia, chronic dysentery with mucus, skin eruptions and haemoptysis.[10]

***Dillenia pentagyna* Roxb.**

Dillenia pentagyna Roxb. belonging to family *Dilleniaceae* is a source of Malabar *Nagakesara.* The part used is dried fruit enclosed by calyces. It is a large deciduous tree grows up to 40 meters in height. Leaves are large, 1-2 ft, alternate, ovate-rhomboid, obtuse or acute. Flowers are yellowish, fragrant, 2-3 cm across, arise from the nodes of fallen leaves, on panicles. Fruits are 2.5 cm in diameter, globose which contain single seed. The flower-buds and young fruits have a pleasant, acid flavor and are eaten raw or cooked in south and central India. The ripe fruits are also eaten. Dillenia, named in honour of J. J. Dillenius (1684-1747), a noted botanist. Pentagyna in allusion to the flower having five styles.[11] *Dillenia pentagyna* Roxb. is distributed in Indo-Malaysian areas extending to tropical Australia; throughout India particularly in sub-tropical Himalayas, found in most places of Mizoram state, India.[12] The plant pacifies vitiated *Vata, Kapha*, anal fistula, wounds, diabetes,

diabetic carbuncle, neuritis, pleurisy, pneumonia, and burning sensation.[11]

***Callophyllum inophyllum* Linn.**

It belongs to family *Guttiferrae* and part used is bark and seed oil. *Callophyllum inophyllum* Linn. *(Kamani)* is a very handsome, small or middle-sized glabrous tree, with a crooked trunk; bark grey, smooth. Leaves are 10-18 by 7.5-10 cm. broadly elliptic, rounded at the apex, often emarginated, with waved margins and very close lateral nerves, giving a striate appearance to the blade; base acute; petioles are 9-15 mm. long, stout, flat. Flowers are 1.9-2.5 cm in diameter, pure white, fragrant, few-flowered racemes are 10-15 cm. long. Sepals are 4, ovate-orbicular, concave, reflexed. Petals are 4, oblong, obtuse, spreading. Stamens are numerous; filaments are united into 4-6 bundles. Style is long, twisted; Stigma large, mushroom-shaped. Fruits areglobose, 2-5-3.8 cm. diam, smooth, yellowish; pulp is scanty. It grows along coastal areas and adjacent lowland forests, although it occasionally occurs inland at higher elevations. *Callophyllum inophyllum* Linn. is distributed along the Eastern and Western coasts of the Peninsula, Burma, the Andamans and Malaya Peninsula, Ceylon, Eastern African Islands, Malaya, Australia, Polynesia. Bark is hot with a sharp taste; heals ulcers and inflammation of the eye; destroys "*Kapha*" and "*Vata*;" lessens appetite; astringent; improves the complexion. In Southern India, the oil of the seeds of the plant is used specifically for treating skin diseases. It is also applied topically in cases of rheumatism. The oil is useful in waterproofing cloth and is used as a varnish. In the old days an extract from the fruit was used to make a brown dye to colour cloth. The oil can also be used to make soap.[13],[14]

***Cinnamomum tamala* Fr-nees:**

It is a small evergreen tree up to 1.4 m. girth and 7.5 m. high. Bark is dark brown or blackish, slightly rough. Leaves are opposite, sub opposite or alternate, 12.5-20 by 5-7.5 cm., ovate lanceolate or oblong, acuminate, the acumen often falcate, coriaceous, glabrous, scarcely shining above, glaucous beneath, 3-nerved from close above the base almost to the apex. Petiole 7.5-13 mm. long. Flowers are 7.5 mm. long, pale yellowish, in axillary and terminal lax puberulous panicles 5-15 cm. long. Perianth- lobes 6, oblong, silky pubescent, breaking off transversely below the middle after flowering. Filaments are villous. Drupe is 13 mm. long, ovoid, fleshy, black, supported by the enlarged perianth-tube bearing the truncated perianth-lobes. It is distributed throughout tropical and subtropical Himalaya upto 3,000-7,800 ft. The leaf is bitter, sweetish; useful in vitiated *Vata*, scabies, diseases of the anus and rectum, piles, heat troubles, bad taste. The essential oil of the leaves is used as carminative, anti flatulent, diuretic and in cardiac diseases.[15]

MATERIALS AND METHODS

The genuine sample of *Mesua ferrea* Linn. was collected from Herbal Garden of Rishikul Govt. Ayurvedic P.G. college and Hospital Haridwar (U.K.). Other drugs were collected from market and field survey from different places of our country as an authentic samples and for organoleptic macroscopic, microscopic and phytochemical study, namely- *Nagakesara*/ Yellow *Nagkesara* (*Mesua ferrea* Linn.), Red/ *Ratan Nagakesara* (*Orchrocarpus longifolius* B & H), Black *Nagakesara* (*Cinnamomum tamala* fr.nees./ *Cinnamomum wightii* Meissn), *Punnag Nagakesara (Callophyllum inophyllum* Linn.), *Malabar/Bhavya Nagakesara (Dillenia pentagyna* Roxb). The market samples of drug sold under the name *Nagakeshar* were collected from different palaces like Amritsar (Sample -1), Delhi (Sample -2), Jaipur (Sample -3), Mumbai (Sample -4), Chennai (Sample -5), Kolkata (Sample -6), Haridwar (Sample -7), Lucknow (Sample -8). Details of sample collection are given in **Table no. 1 (Fig. 1)**

Table 1: Details of sample collection

Place	Collection Date	Address
Amritsar	07/10/2009	Baba Drug House, Majith Mandi, Amritsar
Delhi	15/11/2009	Raw Market Khali Bowly, Delhi
Jaipur	10/01/2010	Chunnilal Kalyan Bux,Tripolia Bazar,Jaipur
Mumbai	12/02/2010	Dadar Pharmacy, Near jain Mandir, Mumbai
Chennai	08/03/2010	Raw Market, Chennai
Kolkata	22/05/2010	Suran Das and Company, Bada Bazar, Kolkata
Haridwar	18/06/2010	Chirayu Herbo Pharmacy and Rishikul Govt. Ayurvedic Pharmacy, Haridwar
Lucknow	28/06/2010	Lucknow Jadi Buti Aushdhi Kendra Rakabganj, Lucknow

SAMPLES IDENTIFICATION

Few field/market Samples of Haridwar and Chennai (Plant Material) were morphologically authentified by CIF, NBRI, LUCKNOW with Ref.No. :NBRI/CIF/344/2012.

Procedure for Examination of Market Samples

- The market samples were spread thoroughly into a thin layer over the paper and examined through lens to find out presence of parts of plants like flower, buds, fruits, leaves, or any such parts showing cardinal feature that helps in exact identification of the sample.
- The dried leaves were soaked in water for 10-15 minutes and then carefully spread over the newspaper to establish the identity.

MARKET SURVEY

The attempt was made during survey of markets to collect information regarding trade name, local name, origin, time of collection of the sample drugs to the extent possible in addition to procurement of samples of crude drugs. An effort was made to collect authentic field samples of selected crude drugs along with substitutes of the plants and brief field notes has been recorded containing relevant inputs from the field and relevance of local names in establishing identity of a particular plant was discussed. The samples were subjected to organoleptic study to delineate features of identification. The market samples were subjected to comparative assessments, ~~some~~ simple tests and observation methods to establish identity. The main objective of the study was to study the position of *Nagakesara* in the crude drug market.

- On conducting survey in 8 different markets, it can be concluded that genuine *Nagakesara* is *Mesua ferrea* Linn. which is available in the name of 'Yellow *Nagakesara*' or 'Flower of *Nagakesara'*.
- In Gujarat, Maharashtra and most parts of North India, *Ochrocarpus longifolius* Benth & Hook. is considered as *Nagakesara* and sold in the market with name 'Lal (Red) / *Ratan Nagakesar'*. It is also known as *Padma keshar*.
- In south Indian states especially in Tamil Nadu (Chennai and Madhurai market), unripened fruits of *Cinnamomum tamala* N&E. or *Cinnamomum wighti* Meisssn. is considered as *Nagakesara* and sold in the name of Black *Nagakesara/ Karu / Siru Naagappu*. This is widely used by the Siddha practitioners in the state. These varieties are commonly used as substitutes/adulterants for *Nagakesara*.
- In Malabar region, especially in Kerala, the *Nagakesara* is taken as *Dillenia pentagyna* Roxb. It is called as *Bhavya* or Malabar *Nagakesar* or *Natttu Nagakesara*.
- Apart from this, in all over India *Calophylluminophyllum* Linn. is another source widely used as a substitute for *Nagakesara* due to its resemblance with the floral buds of *Surapunnaga* (*Ochrocarpus longifolia* Benth & Hook.)
- In the raw drug market of Jaipur, Chennai, Amritsar and Lucknow, the material sold by the name of *Nagakesara* is the buds of *Nagakesara*, they do not supply flower or stamen of *Nagakesara*.
- In the raw drug market of Haridwar, Kolkata, Mumbai and Delhi, the drug was available in the form of flower & buds both. Hence both the samples were separately procured and taken up for study.

Organolepic characters of different samples:

They are shown in Table no. 2.

Table no. 2: Organolepic Characters of Different Samples

S. No.	Organoleptic Character	Sample no.1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8
1.	**Color**	Dark Reddish brown	Light Brown	Dark Reddish	Dark Blackish	Dark Reddish brown	Light Brown	Light Yellowish	Light Brown
2.	**Odour**	Not significant	Sweetish Smell	Not significant	Unpleasant	Not significant	Sweetish Smell	Sweetish	Sweetish Smell
3.	**Taste**	Not significant	Sweetish	Not significant	Slightly Sweetish	Not significant	Sweetish	Sweetish	Sweetish
4.	**Shape**	Oval Rounded soft epicarp	Fleshy basal Sheath small filament	Oval Rounded soft epicarp	Oval Rounded	Oval Rounded soft epicarp	Fleshy basal Sheath small filament	Fleshy basal Sheath small filament	Fleshy basal Sheath small filament
5.	**Foreign Organic matter**	1-2 %	1-2 %	1-2 %	1-2 %	1-2 %	1-2 %	1-2 %	1-2 %

CONCLUSION

The discontinuity in the healing traditions of *Ayurveda* has led to confusion and controversies over the identity of many medicinal plants. The diminishing natural flora, ever increasing demand and lack of regulation has led to high level of adulteration. There is limitation of modern standardization methods in holistically evaluating the botanical raw materials. The original *Nagakesara* i.e. *Mesua ferrea* Linn. is found in major quantity in Assam and eastern Himalaya. So it is used as an ornamental plant there due to attractiveness and good fragrance by the local community in their gardens. But due to lack of knowledge of its medicinal properties, the flowers are not being collected, so there is lack of availability of *Nagkeshara*. On conducting survey in 08 different markets it can be concluded that genuine Nagakesara i.e. *Mesua ferrea* Linn. is available in the name of 'Yellow *Nagakesara*' or 'Flower of *Nagakesara*'. In south Indian states especially in Tamil Nadu (Chennai and Madhurai market) unripened fruits of *Cinnamomumtamala* N&E. or *Cinnamomum wightii* Meisssn. is considered as *Nagakesara* and sold in the name of Black *Nagakesara*. In Malabar region, especially in Kerala the *Nagakesara* is taken as *Dillenia pentagyna* Roxb. it is called as *Bhavya or Malabar Nagakesara.* The present paper was a step towards the objective of developing organoleptic guidelines for practical identification of raw drugs, not the final word in this direction. The author strongly believe further research in this line involving other such controversial drugs.

REFERENCES

1. Prof. V. K. Dixit. Controversial ayurvedic herbs. J Adv Pharm Technol Res. 2011 Apr-Jun; 2(2): 78–80.
2. Vaidya Bapalal, Some controversial drugs in Indian Medicine, Reprint : 2014, Varanasi : Chaukhambha Orientalia; p.60
3. Shri Bhava Mishra, Bhava Prakasha Nighantu, Translated by Prof. K.R. Srikantha Murthy, Vol. 1, Varanasi: Chaukhambha krishnadas academy, Year 2004. p.217
4. GargSunita, Substitute and Adulterant plants. New Delhi: Periodical Expert Book Agency; 1992.
5. A. Anandakumar, M. Balasubramanian, and R. Muralidharan. Nagakesara - A Comparative Pharmacognosy. AncSci Life. 1986 Apr-Jun; 5(4): 263–268.
6. Indian medicinal plants, forgotten healers by Dr. Prakash Paranjpe, Delhi : Chaukhamba Sanskrit Pratishthan, Year 2005.p.181
7. https://ayurherbs.wordpress.com/naga-kesara/ (Accessed on 6/12/14)
8. Sastri N. 6, L-M. New Delhi: Council of Scientific and Industrial Research; 1962. The Wealth of India (Raw material) p. 252.
9. Kuntal Ghosh, M.S.Baghel, Pharmacognostical Study of Ochrocarpus longifolius Benth and Hook - A Substitute of Mesua ferrea; International Journal of Pharmaceutical & Biological Archives 2011; 2(5):1451-1455.
10. http://in1010418910.trustpass.alibaba.com /product/138412015105985022/OCHROCARPUS_LONGIFOLIUS.html (Accessed on 8/12/14)
11. http://flowersofindia.net/catalog/slides/Karmal.html (Accessed on 10/12/14)
12. Surya Bali Prasad, G Rosangkima, T Rongpi. Studies on the ethnomedical value of *Dillenia pentagyna* Roxb. in murine model. The Journal of Pharmacy 02/2009; 2(2):243-249.
13. J. B. Friday and Dana Okano. *Calophyllum inophyllum (kamani).* Species Profiles for Pacific Island Agroforestry, April, 2006.
14. http://en.wikipedia.org/wiki/Calophyllum_inophyllum_seed_oil (Accessed on 10/12/14)
15. Gunjansharma, A.R. Nautiyal. Cinnamomum tamala: A valuable tree from Himalayas. Int. J. Med. Arom. Plants, ISSN 2249 – 4340, Vol. 1, No. 1, pp.1-4, June 2011

Cite this article as:
Chaubey Suresh, Tewari Ramesh Chandra, Kurele Rajeev, Kotecha Meeta, KourGagan Deep. Pharmacognostical Evaluation of Nagakesara Used in Different Parts of India. Int. J. Ayur. Pharma Research. 2015;3(1):46-51.

Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Chaubey Suresh
Assistant Professor
PG Dept. of Dravyaguna
Rishikul State PG Ayurvedic College and Hospital, Uttarakhand, India
Ph: +919452811909
Email: schhw235@gmail.com
sureshdr235@rediffmail.com

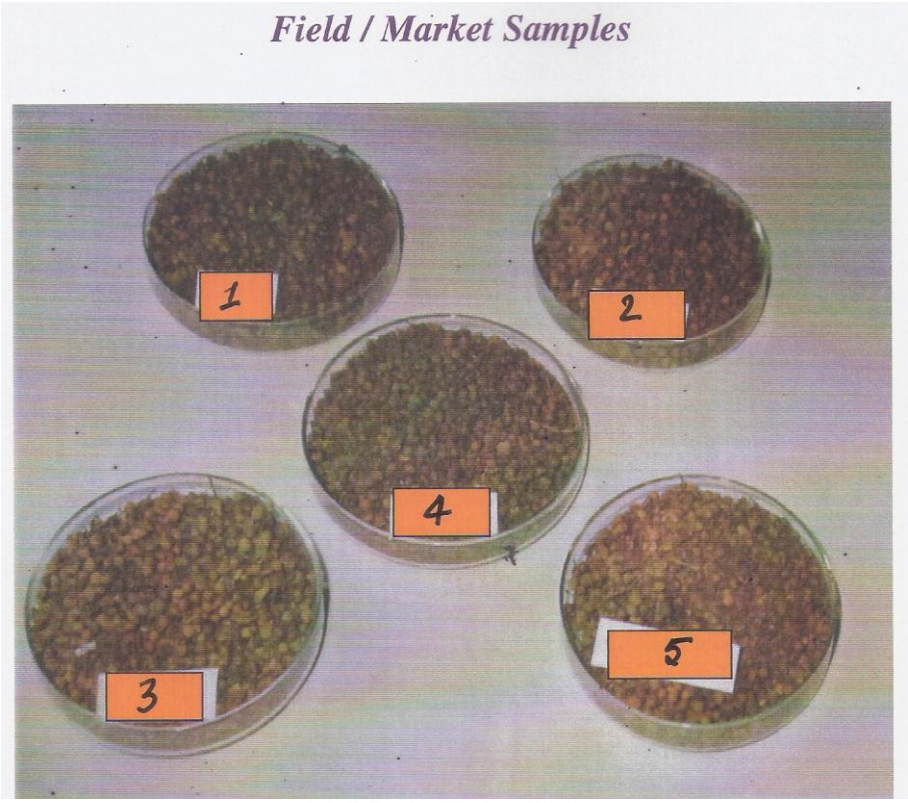

Fig. 1: Shows details of five samples where Sample -1 represents Amritsar sample, Sample -2 is of Delhi, Sample –3 of Jaipur, Sample -4 of Mumbai, Sample -5 from Chennai

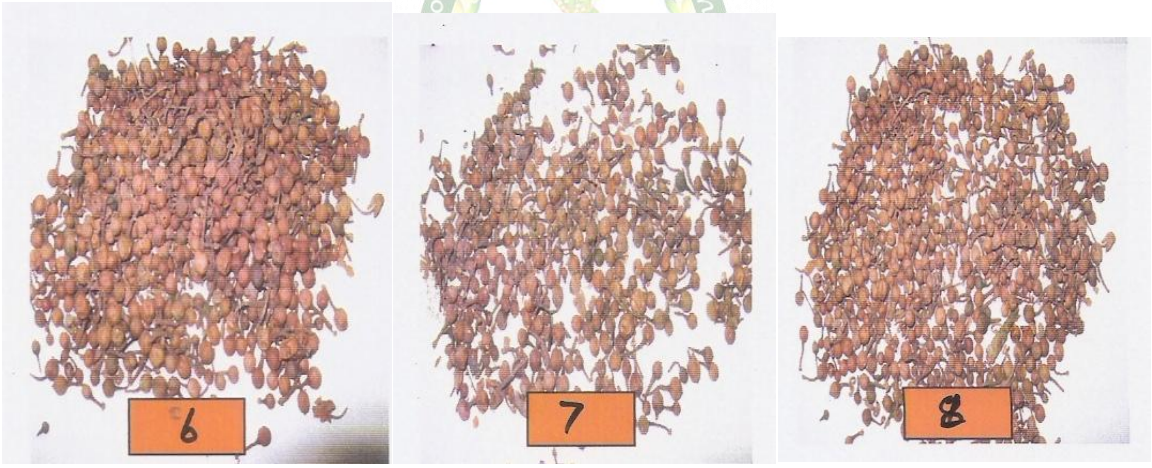

Fig. 2: Shows details of other three samples where Sample - 6 represents Kolkata sample, Sample -7 is of Haridwar and Sample -8 is of Lucknow