

# Comparison of Quality Enhancing Method of Modern & Ayurvedic on Tulasi (*Ocimum Sanctum*)

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## Abstract

Modern civilization, Industrialization and the population explosion has shrunken forests as well as the land available for cultivation in our country which has badly affected the availability of medicinal plants as the quantity of medicinal plants is reduced the quality also is compromised. The green revolution was brought about by the use of chemical treatments on the seeds, plants, used of the pesticides and chemical manures. It would be worthwhile to study whether similar pattern can be employed to increase the no. of plants and their quality in the field of cultivation of medicinal plants. Although, plant breeding appears to be the principal way of improvement, and can give good results in terms of resistance to pathogens, active component content and yield; the agronomical and the technological approaches are also very important. An agronomical method to improve the quality & quantity of the plants includes treatments of seeds & the growing plants with Bio-engineered herbal products along with the use of organic manures. The scientist in the field of botany and agriculture have developed some method of quality enhancing by treating seeds, seedlings or young shoots or buds in plant breeding with some suitable chemical treatments. These method have given satisfactory results in the form of increase in the yield. Hoping that the quality also improves it would be worthwhile to grow medicinal plants on the similar lines. The relevant literature reveals that Colchicine treatment on seeds or seedling or emerging buds for quality enhancing of medicinal plants will be worth studying.

**Keywords:** *Ocimum sanctum*, *Cholchicine*, *decoction*.

## Introduction

Colchicine is a toxic natural product and secondary metabolite, alkaloid originally extracted from plants of the genus *Colchicum luteum* i.e. *Colchicum luteum*. Since chromosome segregation is driven by microtubules, Colchicine is also used for inducing polyploidy in plant cells during cellular division by inhibiting chromosome segregation during meiosis<sup>[1,2,3,4]</sup> half the resulting gametes therefore contain no chromosomes, while the other half contain double the usual number of chromosomes (i.e., diploid instead of haploid as gametes usually are), and lead to embryos with double the usual number of chromosomes (i.e. tetraploid instead of diploid)<sup>[5]</sup> While this would be fatal

in animal cells, in plant cells it is not only usually well tolerated and properties of the plants can be enhanced. This necessitates to the plant with chemical treatments by suitable chemicals or organic materials on the seeds before sowing.

*Ocimum sanctum* (O. sanctum) is of family labiatae regarded in Ayurveda as a kind of 'elixir of life' and believed to promote longevity.

To generate the scientific evidences a comparative study of morphological and phytochemical of O. sanctum and O. sanctum grown after treating it's seeds with O. sanctum decoction and colchicine and *Colchicum luteum* was studied.

## Material and Method

### Material:

1. *O. sanctum* seeds.
2. The materials used for treating the *O. sanctum* seeds
  - i. Decoction of *O. sanctum*
  - ii. Colchicine
  - iii. *Colchicum luteum*

### Method

**Sample A:** *O. sanctum* plant grown after soaking *O. sanctum* seeds in distilled water for 24hrs.

**Sample B:** *O. sanctum* plant grown after soaking *O. sanctum* seeds in *O. sanctum* decoction for 24hrs.

**Sample C:** *O. sanctum* plant grown after soaking *O. sanctum* seeds in Colchicine solution for 24hrs.

**Sample D:** *O. sanctum* plant grown after soaking *O. sanctum* seeds in weak infusion of *Colchicum luteum* for 24hrs.

B. The **Decoction** was prepared as per the method mentioned in **Sharangadhar Samhita** which was used for treatment of seeds for 24hrs.

C. The Colchicine solution was prepared by dissolving 100mg of the powder of the chemical in 100ml of distilled water (1000ppm) and the 5ml of this solution was added to 5ml of distilled water to make it 500ppm. This solution was used to soak the seeds of *O. sanctum* for 24hrs.

D. The dried tuber of *Colchicum luteum* plant was crushed to obtain fine powder. 100mg of this powder

was added to 100 ml of distilled water and mixture was churned for about 1hr. The mixture thus prepared was strained with fine cloth. The solid was discarded and the fluid was used in quantity of 5 ml to which 5ml of distilled water was added and the seeds of *O. sanctum* were soaked in this weak infusion for 24hrs.

The seeds thus germinated in the pattery dishes were transferred to the not manure soil. The plants of all the groups thus grown were sufficiently watered and were observed daily. After the appearance of inflorance i.e. after 2 months the plants were studied for following tests.

Morphological appearance, Phytochemical, HPTLC studies of all the groups.

**1. Morphological appearance:** Height of the plant, length of the root, charchaterstics of the stem and leaves were observed.

**Solvent System:** Toluene: Ethyl acetate: Formic acid: Methanol (3: 2: 0.4:0.4) was used as solvent system.

**Chromatographic Development:** Precoated TLC plates was used for Chromatography.

## Observations and Results

### Results of Morphological Charchacter of Tulasi:

On the Comparison of Morphological features of the group A, B, C and D, the variation observed was significantly more than the control group A in all the three group of plants which were grown after treating the seeds with *O. sanctum* decoction (Group B), Colchicine solution (Group C) and weak infusion of *C. luteum* (Group D).

**Table 1: Morphological Observation**

Treatment	Observation Morphological Features
1. Control (A)	Height 11.2 cm shoot length 7.3 cm root length Secondary roots 16 no Stem color slightly purplish Stem clothed with soft silky hair but occurred frequently. Petiole length 2.1 cm Leaf Elliptical slightly acute, apex, margins slightly serrated. Leaf with 8-9 subveins.
2. T-1 Decoctions (B)	Height 22.2 cm Shoot length 12.1 cm root length Secondary roots length no33 Tertiary roots are also found. Petiole length 2.3-2.6 cm. Stems clothed with silky hair Leaves with elliptic ovate blade Apex acute.
T-2 Colchicine	Height 18.2 cm shoot length 19.1 cm root length Secondary root length no 24 Tertiary roots are also found. Stem colour dark purplish with abundant silky hairs. Secondary branched develop, petiole length 1.5 to 1.9 cm. Basal leaves with emarginated leaf apex, while upper ones are acute at obtuse leaf apex.
T- 3 Colchicum luteum (D)	Height 18.6 cm Shoot 9.2 cm root Secondary roots – 20 Leaf, petiole length 1.6-1.0 cm, margins Deeply surrounded with acute apex. Main vein with 8-9 subveins. Stem colour – slightly purplish Silky hair abundantly found

**Table 2: Morphological character of all samples**

Sample	Shoot	Root	Sec. Root	Petiole
A	11.2.	7.3	16	2.1
B	22.2	12.1	33	2.3-2.6
C	18.2	19.2	24	1.5-1.9
D	18.6	9.2	20	1.6-1.0

**Table 3: Phytochemical Study of Samples**A, B, C and D of *O. Sanctum*

Sr.No.	Parameter↓/Samples→	A	B	C	D
1	Foreign matter %	0	0	0	0
2	Total Ash value %	7.87	6.34	7.35	8.59
3	Acid insoluble Ash %	0	0	0	0
4	Water soluble extractive %	68.75	69.88	68.98	69.45
5	Alcohol soluble extractive %	78.64	79.77	78.95	79.56
6	Total % of Alkaloids	24.65	26.82	26.45	26.55
7	pH	6.75	6.79	6.92	6.8

**Table 4: HPTLC Analysis of *Ocimum Sanctum* of Different Treatment in Respect to Eugenol Content**

No.	Start Rf	Start Ht	Max Rf	Max Ht	Max %	End Rf	End Ht.	Area	Area %	Eugenol %
1. Control	0.38	0.8	0.44	255.7	74.99	0.50	3.9	6593.5	83.47	0.24
2. Control	0.38	0.1	0.44	260.0	76.65	0.50	3.2	6725.2	84.94	0.24
3. Decoction	0.39	0.7	0.44	301.6	40.24	0.50	2.6	7877.4	47.41	0.29
4. Decoction	0.39	0.9	0.44	292.5	39.02	0.50	2.8	7850.3	47.24	0.29
5. Colchicine	0.39	0.4	0.44	309.3	41.66	0.50	3.0	8099.1	47.15	0.29
6. Colchicine	0.39	0.1	0.44	294.6	33.22	0.50	3.8	8000.1	46.41	0.29
7. Colchicum luteum	0.40	0.1	0.45	316.7	38.51	0.50	3.0	8287.9	42.80	0.30
8. Colchicum luteum	0.40	0.4	0.45	312.3	32.11	0.50	3.0	8161.2	37.14	0.30

**Table 5**

Samples	Eugenol Area	Eugenol %
Control (A)	6725.2	0.24
Decoction (B)	7877.4	0.29
Colchicine (C)	8099.1	0.29
Colchicum luteum (D)	8287.9	0.30

### Discussion

These studies the plants were grown by treating the seeds of *O. sanctum* by *O. sanctum* decoction group B, colchicine and *Colchicum luteum*. The plants were

grown for two months till inflorescence appeared. The morphological characters of all the groups were studied along with the chemical composition.

*O. sanctum* is having maximum medicinal and healing properties commonly occurred in near about all the regions of the India and mostly tropic & subtropics regions of the world. It is necessity to increase the quality and quantity of this valuable drug.

To provide a scientific basis for quality enhancement it decided to undertake four groups labeled as 'A' 'B' 'C' 'D'. A - Control group, B - Decoction treated, C - Colchicine treated, D - *Colchicum luteum* treated. A

comparative study of all these samples was carried out. Some of them are mentioned Ayurvedic Pharmacopeia of India and Qualitative analysis of ICMR while the remaining are standard operative procedure explained by the experts.

**Morphological character:** It is observed that the height of plants group B is practically doubled (22.2cm) than that of control Group A (11.2 cm), where as that of group B grew 22.2cm Group C grew 18.2cm and Group D grew 18.6cm. It seems that the average growth in length of the shoot is maximum in group B followed by Group D & C in comparison with control Group A. The height of shoots is significantly more in the treated group.

The length of root of the control group A is 7.3 where as that of Group B is 12.1, Group C is 19.2 and Group D is 9.2 which indicates that the length of root of group C is largest than that of Group B, Group D and Group A but roots of group B and D are also longer than the control group. Roots are meant for giving the stability to the plant and providing nutrition this being one season plant stability is not much required and the roots are hardly used for medicinal purposes.

The numbers of secondary roots also highest in group B that is 33 and that of group C has 24, Group A has 16 and group D has 20 which suggest that the group B instead of growing in length grow in number suggesting that the nutrition provided to the plant is more.

The length of the petiole is also more in group B than that of group A group C and D are comparable with the control.

In comparison to control group A (7.87%) it was observed that the **Total Ash value%** content of sample C is 7.35 which is similar that of sample D is 8.59 which is significantly more than that of control group A. Ash value of group B is 6.34% which is significantly less than that of control group A and also of group C and D. Ash being an inert material lesser value of ash indicates that the organic material which is active is more in that sample implying that the plant which has lesser ash is more active hence it is concluded that the plants of group B are of better quality than control group A and other groups C and D.

The values of **acid insoluble ash** is zero % which if compared with the normal range i.e. not more than 3 %

shows good quality of the samples. Acid insoluble ash denotes presence of siliceous matter in the drug which in lesser amount indicates better quality of the herbal drug. All the sample shows 0% acid insoluble ash indicating that the medicinal value of all the samples is good.

In comparison to control group A 68.75 % it was observed that the **water soluble extractive%** content of sample C is 68.98, sample D is 69.45 and that of sample B is 69.88 which is shows that the water soluble extractive is maximum in Group B which is significantly more than that of control group A and group C and D. the group C and control Group A are comparable where as group D it is significantly more.

It can be safely said that water soluble amino acids, carboxylic acid and vitamins are more in plant which has more water extractive values denoting greater activity therefore it can be concluded that in comparison with control and other groups, group B plant is more potent.

The presence of alkaloids, glycoside, steroids, anthraquinones and triterpenoids are estimated by alcohol soluble extractive values. It was observed that the **Alcohol soluble extractive%** content of sample C is 78.95, sample D is 79.56 and of sample B is 79.77 in comparison with control group A shows increase in the Alcohol soluble extractive% meaning there by the above said chemicals are comparable in the treatment groups but are significantly more than that of group A 78.64 indicating better availability of these chemicals.

In comparison to control group A 24.65 it was observed that the **alkaloids content** of sample C is 26.45, sample D is 26.55 and that of sample B is 26.82 which is showing improvement in the alkaloids in all the treatment groups in comparison with group A treated groups are comparable with each other but are significantly more than that of control group A. Alkaloids are the major active ingredients of any plant. Their increase suggest better activity of the drug<sup>[6-16]</sup>.

The drugs with low **pH** (acidic pH) have better absorption in intestine, as absorption of drug is dependent on pH of intracellular and extracellular fluid. So, the pH of the drug should be low and when the values were Compared to control group A it was observed that the pH Values of group C is slightly more where as that of Group B and D are similar to group A. It seems that there is no difference in pH of plant extracts in the treated groups.

It was noticed from the graph that **Eugenol %** in all the plants in the treated groups is significantly higher than that of control group A whereas there is negligible Difference among Eugenol % in B, C and D. eugenol being volatile oil is considered as active principle of the plant *O. sanctum* which is mostly used in respiratory tract disorder. Increase in eugenol after different indicates increase the potency of the plant.

So, considering this it can be said that decoction treatment & *Colchicum luteum* treatment to plants especially *O. sanctum* is equally effective as Colchicine used today. So, New Decoction & *Colchicum luteum* treatment can be considered as new options for quality enhancement in plants.

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