



EXPLORING THE IMPACT OF OCIMUM BASILICUM AND SAMBUCUS NIGRA ON PEST CONTROL & YIELD OF SOLANUM LYCOPERSICUM

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ABSTRACT:

Tomato, *Solanum lycopersicum*, is an important economic crop in India. Agrohomoeopathy contribute to the control of plagues and diseases, directly promoting increased production. In agriculture, homoeopathy helps to control the diseases of the plants by promoting the physiological activity of the plant. The Homoeopathic preparations can influence the growth, secondary metabolites production, essential oil yield and phytochemical profile when applied in the plants.

This study is to know the effect of homoeopathic medicine in controlling pests and effect on yield by *Ocimum basilicum* and *Sambucus nigra* on the most used crop *Solanum lycopersicum*. The potencies are 30CH and 200CH for each medicine.

It is observed that the medicine *Sambucus nigra*-200CH has shown greater increase in growth of the plant and also control in pests. Next to this is *Ocimum basilicum*-30CH where it shown the better yield than the other group of plants when compared with the natural growth of tomato plants and with fertilizer and pesticides use of other group of plants.

KEY WORDS:

Agrohomoeopathy, *solanum lycopersicum*, *sambucus nigra*, *ocimum basilicum*, Yield, Pest control.

INTRODUCTION:

The extensive use of synthetic fertilizers in agriculture is causing environmental problem. In this situation it is desirable to find out suitable agents, which would increase plant growth without compromising with the quality of plants and of soil. In homeopathy a substance, which produces morbid symptoms at high doses on healthy individuals, ameliorates the disease in a patient showing similar symptoms at ultra low doses.

In plants, the low potencies are to be applied for acute symptoms and damages in plants [6CH, 9CH] whereas the medium potencies for problems with the tendency to certain fruit trees [12CH, 30CH] which are harmless for the user. This is important, due to the fact that use of



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agrochemicals and especially pesticides, frequently causes injury and sometimes death of farm workers. It is inhumane to use these chemicals if it is known that a poison can be inhibited by the



same poison when it has been prepared homoeopathically and therefore one can avoid injury and death of many plants. It do not contaminate land or people and help support the regeneration of the ecosystem. The potencies do not injure micro flora and fauna or the aquifer mantles.¹

Agrohomoepathy can also reverse damage already present in the ground because of the use of fertilizers or pesticides or excessive salinity. There is already scientifically verified evidence supporting the relevant of applying homoeopathic medicines to plants before and during sowing or directly on the ground.¹

Tomato plants are used in various experiments in order to know about the stress levels in it and also insect tolerance transgenic tomato plants are also been made. Through ages pests and plant diseases have remained a constant threat to the quantity and quality of overall crop production. Once correct disease is identified, by symptoms, proper control measures can be applied. Few diseases that usually occur in tomato plants are Late blight; Grey spot and bacterial canker.

Tomato leaf curl virus (ToLCV) causes 30-100% yield loss, this had stimulated research to find a suitable remedy. Use of Homoeopathic medicine psorinum in agriculture was to validate the potential of agro-homoeopathy in viral infection. Even the post harvest quality of tomato treated with high dilution preparations. The ultra dilution of homeopathic medicines can be used safely for various purposes. But precautions are to be taken before the use of these drugs. Proper selection of the potency of required drug this can be very cost effective alternative that can increase farmers income by lowering the input cost of chemical fertilizers and insecticides.²

Plants that help each other are grown together since ancient times, like tomato and basil, beans and potatoes, corn and potato and other plant and herbs. Ultra high dilution of homoeopathic medicines can be used safely for various purposes (Seed germination, betterment of soil health, growth of seedlings, flowering, fruiting and protection against diseases and to overcome environmental stresses). But precautionary measures (proper selection of homeopathic drugs and its potency, proper dilution of drug with water) must be taken before use of these drugs. Wrong drug selection can show detrimental effects on crops and it is believed that higher dilution of drugs (1: 500 or 1: 1000) with water is more effective for plants. If there is proper selection of drug and its potency, agrohomoepathy can be an efficient and very cost-effective alternative that can increase farmers income by lowering the input cost of Chemical fertilizers and insecticides.²

Homoeopathic preparations are being used efficiently for increasing active principles in medicinal plants, plant detoxification for metals, increasing plant growth rate and productivity, plant metabolism and control of diseases.

The extensive use of synthetic fertilizers in agriculture is causing environmental problem. It is desirable to find out suitable agents which would increase plant growth without compromising the quality of plants and of soil. In homoeopathy a substance which produces morbid symptoms at high doses on healthy individuals, ameliorates the disease in a patient showing similar symptoms at ultra low doses.



Dynamisation or potentization (by process of trituration or succession) is unique aspect of the science of Homoeopathy that in comparison to simple dilution, even at higher levels, is more effective. It is a fact that the high potency of a drug is sometimes the best antidote for the effects of the crude drugs.

The main objective is to know about the effects of homoeopathic preparations *Ocimum basilicum* and *Sambucus nigra* on plant *Solanum lycopersicum* (tomato) as the medicine naturally improves the plant resistance against pests and helps to improve natural immunity of the plant and promotes growth without actual use of pesticides.

PREPARATION OF HOMOEOPATHIC DILUTIONS:

Direct use of homoeopathic drugs may lead to negative outcomes in agriculture. Drugs must be diluted with water and mixed properly before application. Drugs can be diluted with water at various ratios :100, 1:200, 1:500, 1:1000, 1:5000 etc. It was reported that at higher dilution there is no effect of vehicle (alcohol) remains. Sukul *et al.*, (2012) reported that at 1:1000 dilution the effect of alcohol was eliminated but the main component of homoeopathic drug was active.³

DESCRIPTION ABOUT THE PLANT:

SOLANUM LYCOPERSICUM (TOMATO)⁴

Solanum lycopersicum is the edible berry commonly known as a tomato plant. It is originated in western South America and Central America. Tomatoes are significant source of Umami flavor. Various varieties are widely grown in temperate climates. They grow to 1-3 meters i.e., 3-10ft in height. The size of tomato varies according to the cultivator, ranging 1-10cm in width. The leaves are 10-25cm long, odd pinnate, with five to nine petioles.

Scientific classification

Kingdom: Plantae

Division: Magnoliophyta

Order: Solanales

Family: Solanaceae

Subfamily: Tracheobionta

Genus: *Solanum*

Species: *Solanum lycopersicum*

Binomial name: *Solanum pimpinellifolium*, *Solanum cerasiform*.

Effects of four homoeopathic medicines for human use were assessed in two centesimal dynamizations. (7CH and 13CH)



[Silicea terra (SiT), Natrum muriaticum (NaM), Zincum phosphoricum (ZiP) and Phosphoricum acidum (PhA)], and a control treatment (distilled water) on tomato plant germination, emergence, and initial development.⁵

Significant differences were observed in all the morphometric variables assessed in function of the different development stages, homeopathic medicines, and their different dynamizations. During germination, greater growth in stem length was observed with ZiP-7CH (5.5 ± 0.98 cm) compared to the control group (4.3 ± 1.10 cm).⁵

The tomato plants can also be homoeopathically treated by some mother tinctures in order to grow them in low sunlight region.⁵

SAMBUCUS NIGRA:⁶

Sambucus (samb)

Common name: Elderberry

Family: Adoxaceae

Synonyms: Elder, Black Elder, European Elder, European Elderberry and European Black Elderberry.

It is treated for Night shades (solanaceae)

Family- Caprifoliaceae/Adoxaceae. Tincture of fresh leaves and flowers.

GENERAL:

The leaves of sambucus have an unpleasant odor when bruised, which is offensive to most insects, and a decoction of these leaves is some used by gardeners to keep caterpillars from delicate plants. Sambucus was confirmed in the field after its description in the companion plant manuals. They grow in hedges in moist places. It was the favorite medicinal plant of Hippocrates. The active ingredient in its crude form is hydrocyanic acid.

Edematous swellings occur especially in twigs, stems and leaves. Inside the leaf the capillaries do not give passage to sap, and water logging results in these places. The plant can take up carbon dioxide but cannot release oxygen. Evaporation is increased during the day, but ceases entirely at night.

CLINICAL:

It is a general insect repellent particularly against caterpillars. Budworms, army worms .sawflies. Diamondback moth, web worm, cut worm, potato moth, cluster caterpillars, spitfire fly, strike and rot in sheep aphids.

RELATIONSHIP:

Compare: Bomb-pr, Valerie., Vib.⁷



OCIMUM BASILICUM: (BASILICUM)⁸

Basilicum

Common name: Great Basil

Family: Laminaceae

Synonyms: Osmium Basilicum

OCIMUM BASILICUM;

Treatment of Nightshades (solanaceae)

Basil- Ocimum is the companion to tomato, and which will protect the tomato against all pests and which will protect the tomato against all pests and diseases pertaining to it.

Basil Family: Laminaceae/ Labiatae. Tincture of the whole plant.

Previous studies on tomato plants with ocimum basilicum have shown that, with the dilution D6, C30, C200 and 1M four concentrations there is an increased content of beta – carotene, lycopene in tomatoes.⁸

GENERAL:

Basil, as a companion plant, protects tomatoes from both pests and diseases (almost as if giving them a wrap-around shield). For those who grow tomatoes as a commercial crop, and who have little space, making companion planting impractical, homoeopathic remedies can solve the problem.

Thus, bud worm, russet mite, whiteflies, tomato mite, red-legged earth mite and also the two-spotted mite can all be treated with ocimum basilicum. Anthracnose bacterial canker, fusarium wilt, spotted wilt, mosaic virus and blossom end rot can also be treated. It may not be suited to the treatment of other plants, because it is a companion plant to tomatoes. Ocimum basilicum is a constitutional remedy for tomatoes because of its special affinity. In companion plants, this phenomenon is frequently encountered, and can provide new insights into the relationships between the different remedies in the context of human treatment. From further study, much can be learned about the internal relationships between many different remedies that to date have not enjoyed such extensive scrutiny.

Other varieties of ocimum like ocimum canum, ocimum gratissimum and others are equally efficacious and maybe substituted for ocimum in their native countries such as India, Japan, Indonesia, Malaysia, Persia and Africa or South America.

Basil will also improve the taste of the tomatoes.⁷



CLINICAL:

All pests and diseases of tomatoes – Budworms, Russet mite, flies, mosquitoes, tomato mite, red-legged earth mite, two-spotted mite.⁷

EFFECTS OF PESTICIDES AND INSECTICIDES:

Farmers are at risk for airways diseases resulting from exposures which include organic agents and chemicals on the farm. Few data on airways disease and farm exposures are available from population based studies. Insecticide use has been linked to increased risk of non Hodgkin lymphoma (nhl).⁹

During their foraging activity, honey bees are often exposed to direct and residual contacts with pesticides, especially insecticides, all substances specifically designed to kill, repel, attract or perturb the vital functions of insects.⁹

Tomato hornworms are one of the most aggressive and troublesome pests to a farmer's tomato crop and removed manually in many cases where only organic practices are allowed.⁷

Neural effects of insecticides that have repercussions on (a) cognitive functions, including learning and memory, habituation, olfaction and gustation, navigation and orientation; (b) behavior, including foraging and (c) physiological functions, including thermoregulation and muscle activity.⁹

The drug *Basilicum*, as a companion plant, protects tomatoes from both pests and diseases. For those who grow tomatoes as a commercial crop, and who have little space, making companion planting impractical, homeopathic remedies can solve the problem. Thus, bud worm, russet mite, whiteflies, tomato mite, red-legged earth mite and also the two-spotted mite can all be treated with *ocimum basilicum* anthracnose, bacterial canker, fusarium wilt, spotted wilt, mosaic virus and blossom end rot can also be treated.

The drug *Sambucus nigra*, in general the leaves of *Sambucus* are of very offensive odor this naturally repels the insects which contributes to pest free growth of plant. It particularly acts on caterpillars.

This contributes to increase in tomato yield. This makes to strengthen the plant to fight against these insects in which there's increase in immunity of the plant and there will be no use of pesticides.⁷

DISEASES CAUSED TO TOMATO PLANT:

1. Tobacco Mosaic Virus, the only important example, remains active and viable even up to 3 years on tomato seeds derived from diseased plants.¹⁰
2. *Phytophthora parasitica* produces oospores and causes brown to blackish discoloration of stem, which is termed as foot rot, which decays and rotten the plant.¹¹
3. Tomato wilt caused by fungi, *verticillium*, tends to be more severe at high nitrogen levels. It causes epinasty of the leaf petioles, wilting and yellowing of the leaflets.¹²

In Tomato, yellow leaf curl virus infection was apparent in most control plants and a large portion of the nano gro product treated plants. The nano gro treated plants seem to be less infected, but it is impossible to tell if any resistance to this virus was impacted by the Nano gro treatment since infection was so widespread, and more time would have been needed to test this possibility. This gemini virus is spread by whitefly and is major problem for tomato growers. Overall, the results of Nano Gro treatment demonstrated a moderate effect on plant health and yield in tomato.¹²

MATERIALS AND METHOD:

STUDY SITE:

The research was performed in the Herbal Garden of KKC HOMOEOPATHIC MEDICAL COLLEGE AND HOSPITAL.



Figure 1: Green House – where the research is conducted

STUDY DURATION:

The study was done for five months in order to fully observe the yield of the tomato plants- March, April, May, June, and July.

MATERIALS REQUIRED:

1. Certified seeds of Tomato – from regional plant nursery.
2. Seedling tray.
3. Grow bags – 30.
4. Water.
5. Coco peat – 30 kilograms.
6. Soil.
7. Fertilizer – NPK Fertilizer (500grams).
8. Pesticide – Starthene power insecticide.
9. Medicine - Sambucus Nigra 30CH (100 ml) from SBL.

10. Medicine - Sambucus Nigra 200CH (100 ml) from SBL.

11. Medicine - Ocimum Basilicum 30CH(100ml) from SBL.

12. Medicine - Ocimum Basilicum 200CH(100ml).from SBL.

METHOD:

1. Firstly, germinate the seeds by placing them in the seedling tray. Germination of seed is the most important and preliminary step for crop production.
2. Take 60 seeds and plant them in orderly manner of five seeds in a row in six groups in a mixture of soil and coco peat.
3. Water (spray) them morning and evening and keep them in a shadow region without direct contact to sunlight.
4. Later when the plants germinate and starts growing, place them in a low sunlight region.
5. Grow the seedlings till 45 days in the seedling tray. After 45 days, I've shift the plants to the growbags containing mixture of soil and coco peat.

PREPARATION OF SOIL:

Locally available soil was taken in approximate quantity of 50kgs and were mixed with 25kgs of coco peat was also mixed. The mixture was well aerated by thorough mixing. These mixture of soil were added in each grow bags in equal amounts.

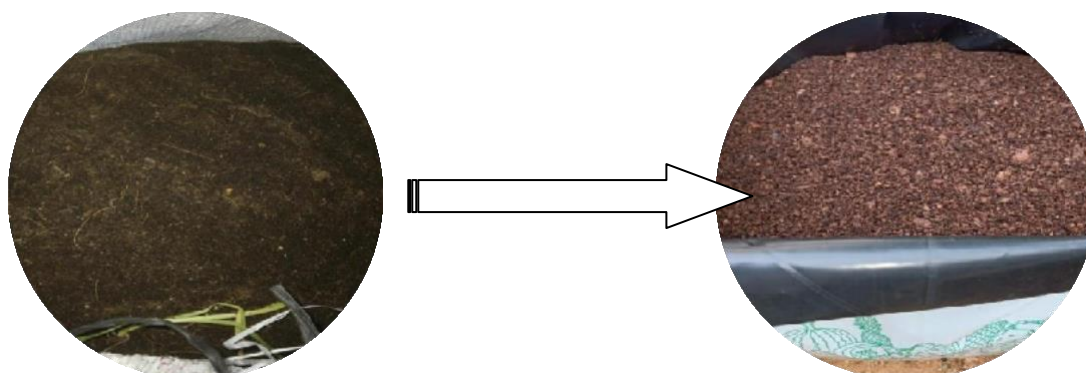


Figure 2: Coco Peat, Mixture Of Coco Peat And Soil In Grow Bag.

GROW BAG:

A grow bag is a large plastic bag filled with growing medium and used for growing plants. For this research purpose, we have added the soil, coco peat, and added water to prepare the soil in order to adapt the plant growth. Even the medicine is sprayed on leaves not on the soil. So, watering is only required.

PREPARATION OF MEDICINE:

SPRAY METHOD:

In 500ml of water, pour 10 drops of medicine for each group of plants. Both morning and evening same quantity is to be sprayed to the leaves because by spraying the medicines to the leaves the absorption of the medicine will be faster as compared with the medicine when it is poured into the soil as it may lead to contamination of the medicine with soil composition.

PREPARATION OF FERTILIZER AND INSECTICIDE:

For the standard group, as mentioned in the fertilizer and in pesticide itself,

- For fertilizer: Use half a spoon of fertilizer into one liter of water and mix them and spray for once in 15 days. Maintain the soil moisture content and plants length maintenance as they grow. Measure the length of the plants as they grow and note them for once in 7 days and check the prognosis of the plants after using medicine and also in the standard group after administration of fertilizer.
- For insecticide: The insecticide Starthene power is sprayed by mixing with water as there are only 5 plants six grams of insecticide is mixed with water and sprayed for every 14 days and changes are noted.

TEMPERATURE:

Ideal germination temperature is between 70°F and 80°F. The seedlings grown slowly in the month May and summer harvest is delayed. The seedlings are kept in shadow not under direct sun light for 6 hours.

The ideal temperature for growth of tomatoes and fruit production ranges between 20°C to 24°C.

SUNLIGHT:

Tomato plants need at least 6 hours of sunlight a day. The plants are placed in the Green house.

WATERING:

Equal amount of water is poured into each plant as per the soil requirement and not too much water is poured as it causes growth for other fungal or bacterial colonization. As per required the water is poured.

GREEN HOUSE:

The interior of a greenhouse exposed to sunlight significantly becomes warmer than the external ambient temperature, protecting the plants in cold climate. For this study, all sets of

plants (six groups) were placed in green house which is situated in herbal garden of KKC HOMEOPATHIC MEDICAL COLLEGE AND HOSPITAL.

ESTIMATED PARAMETERS:

- The growths of each group of plants are noted for every 15 days for five month March, April, May, June, and July.
- The growth rate is compared with the each other groups by length of the plant, number of leaves.

PROCEDURE:

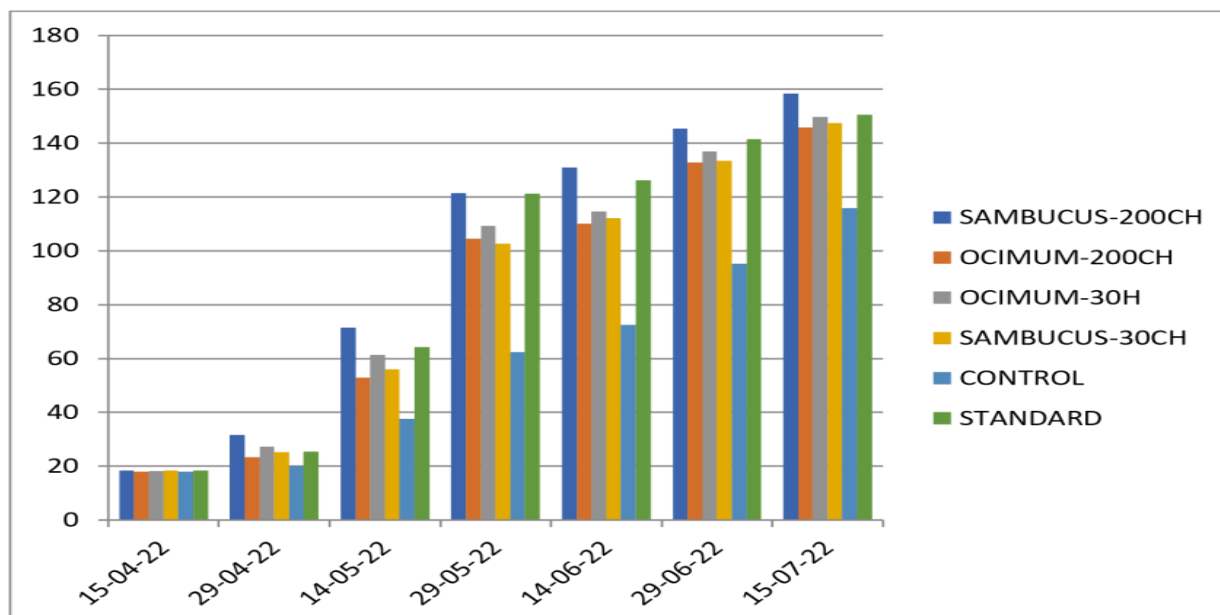
In a seedling tray, place mixture of enough coco peat and soil place the tomato seeds at the center of the mixture and cover the surface with coco peat. Place the seedling tray in shady place not in direct contact with sunlight. Water the seeds thrice the day (on date 15-03-22). The seeds germinated after three days (On date 18-03-22). After few days after germination, place the seedling tray in a low sunlight region. Water them twice a day. After 45 days of growth, take out the plants and place them in grow bag with a mixture of soil and coco peat. At Depth of 8cms and width of 2 cms the plants are planted in the grow bags each seeds planted on date 15-3-22.

RESULTS AND DISCUSSION:

- Sambucus nigra 200 medicine shown the best effect among other group of plants by fastest growth in length and number of leaves.
- Next to Sambucus Ocimum basilicum 30 shown effective in fruit production.
- Standard group with fertilizer also shown good growth but couldn't resist the plant infection and pest.
- Control group shown less yield and growth.

Table 1: Lengths of the plants (average) for every 15 days.

DATE	STANDARD	CONTROL	OCIMUM 30CH	OCIMUM 200CH	SAMBUSCUS 30CH	SAMBUCUS 200CH
15/04/2022	18.4	18	18.2	18	18.4	18.4
29/04/2022	25.4	20	27.2	23.4	25.2	31.6
14/05/2022	64.2	37.6	61.4	52.8	56	71.4
29/05/2022	121.2	62.4	109.2	104.6	102.6	121.4
14/06/2022	126.2	72.6	114.6	110.2	112.2	131
29/06/2022	141.5	95.3	136.9	132.8	133.4	145.4
15/07/2022	150.6	115.9	149.8	145.9	147.6	158.5



From overall, the conclusion can be made that Sqmbucus nigra 200 is best effective in pest control and yield of Solanum lycopersicum(Tomato plant).

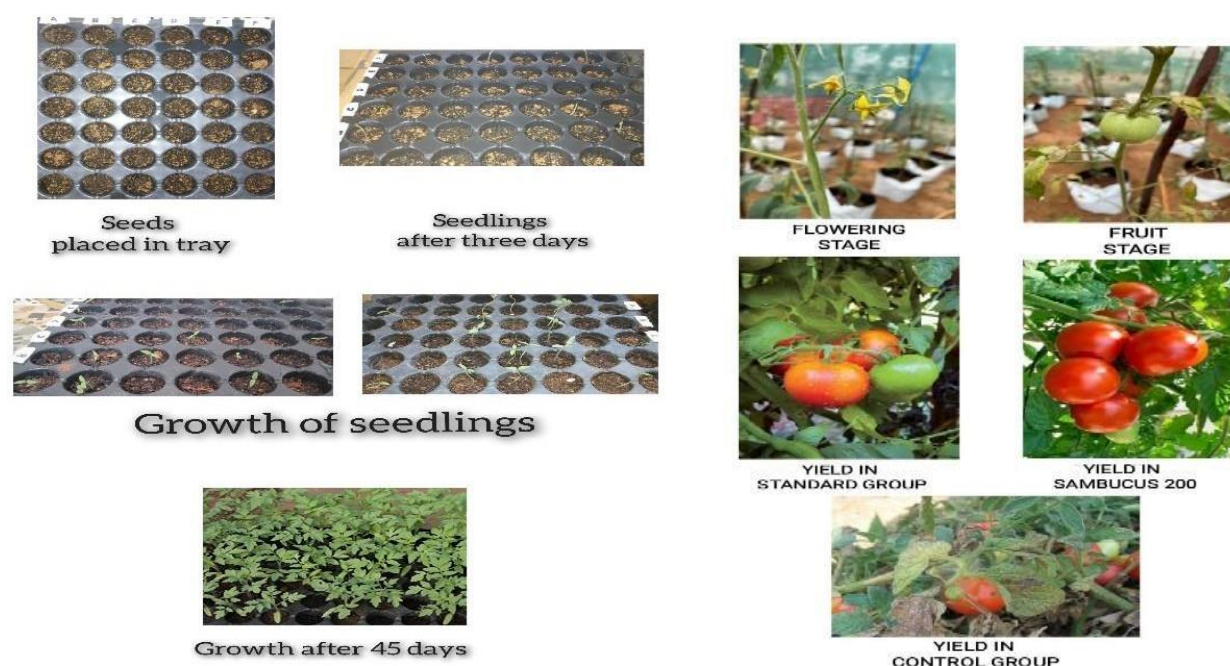


Figure 3 – Showing the growth & yield of Solanum Lycopersicum



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