Building Sustainable Model Green House Nursery, India 2010 From Support to Sustenance





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Initiative Designed, Implemented & Managed by Good Works



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Building Sustainable model- Green House Nursery Palla Village, Delhi

May 11, 2010

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Building Sustainable Model- Carrefour India

Green House Nursery

Palla Village on May 11, 2020

Palla village lies near the Yamuna bank in the northern side of Delhi. It is one of the largest vegetable producing villages in the northern India. There are around 400 farmer households in the village. The farmers of the village have come together to form a local farmers' cooperative-Integrated Agriculture & Marketing Cooperative Society, Ltd, Palla. It consists of 120 farmers.

Palla was the first village where Carrefour initiated its Corporate Social Responsibility in India. The first farmers' empowerment camp under Carrefour's theme of *Swarngeen vikas ki taraf ek kadam* was conducted in Palla in August 2008. Following this, Carrefour India conducted several agricultural extension programmes in Palla like farmers' empowerment camps, on land demonstrations, etc. Residential workshop for farmers of Palla village for 8 days was also conducted for Palla farmers. 35 farmers of this village were taken to the premier institute of agriculture- Indian Agricultural Research Institute, New Delhi for an extensive skill enhancement workshop.

Construction of Green House Nursery in Palla village, Delhi.

Rationale

Subsequent to the various programmes, Carrefour planned to include Palla in its supply chain for its Northern India's cash & carry outlets. To understand the needs of the Palla farmers, Carrefour keeps conducting need assessment surveys in the Palla village. One of the survey indicated that 30% of crop produce of Palla village goes waste while it is in the field. Following this, focused group discussions were held with the farmers and various agricultural extension experts. The discussions revealed that the unhealthy seeds are the major cause of reduced crop production.

The experts suggested that a Green House Nursery will effectively address this problem.

Green House Nursery

Green House Nursery is the most apt method of producing healthy seedlings for transference in the field. The seedlings are free from any disease & thus give a healthy produce. The benefits are:

- 1. Crops could be grown under the inclement climatic conditions when it would not be otherwise possible to grow crops under the open field conditions.
- 2. The crop yields are at the maximum level per unit area, per unit volume and per unit input basis.
- 3. The control of the microcosm allows the production of higher quality products which are free from insect attack, pathogens and chemical residue.

- 4. High value and high quality crops could be grown for export markets.
- 5. Income from the small and the marginal land holdings maintained by the farmer can be increased by producing crops meant for the export markets.
- 6. It can be used to generate self employment for the educated rural youth in the farm sector.

Since, it seemed to be the most promising method to reduce the crop produce and help Palla farmers, Carrefour decided to build a sustainable model of Green House Nursery in Palla village.

On May 11, 2010 Carrefour built the Green House Nursery in the Palla village to procure healthy plantings for increased crop production.

The basic **objectives** of Carrefour to build a Green House Nursery in Palla village were:

- 1. To increase the capacity of local farmers on how to work on new technology-GHN by using local resources.
- 2. To leave behind a sustainable sample model of Green House structure for the farmers in the village.

Process

- 1. Discussions were held with the scientists of KVK, IARI and other agricultural institutes to understand the complete concept of Green House Nursery- costing, material required, applicability and suitability of the farmers.
- 2. The agencies which specialize in the construction of Green House Nursery were contacted and quotes were taken from them to build the nursery.
 - An agency from Ahemdabad- S M Biochemicals was finally shortlisted by Good Works.
- 3. Site mapping was conducted by Good Works in the Palla village to identify the location where the nursery can be built.
- 4. Group discussions were held with the farmers to understand their perception about a Green House Nursery and its applicability.
- 5. Demonstration & group discussion were decided as the communication methods to make the farmers aware about the green house nursery.
- 6. A hands-on training module, which spread across eight days, was developed by Good Works for construction of Green House Nursery in the Palla village of Delhi.
 - Day 1 to 7- The agency constructed the Green House Nursery in the Palla village, under the supervision of Good Works. The farmers would visit the site & see the nursery being constructed. A Technical Assistant from KVK, Shikhopur was also sent to monitor the nursery to make it as per the Palla's suitability.
 - **Day 8-** Eminent and experienced scientists from KVK Shikhopur were taken to Palla village. They talked in details about the benefits, applicability of the green house nursery.
- 7. Relevant literature was prepared in Hindi for the farmers to understand the principles, benefits of the Green House Nursery.

8. Four scientists from KVK Shikhopur discussed about the different aspects of Green House Nursery. These have been given in detail in the later pages.

The nursery was constructed on a 50 acre land which belonged to the village Head of Palla.

Open House Discussion

1. Ram Singh, Farmer- What is the cost of making Green House Nursery? How can we make it?

Scientist Ramsevak replied- Nurseries of such kind are made on a large scale. These are technically very sound and thus it is not feasible for a farmer to construct it on its own due to economic constraints. The best viable option is that 10- 15 farmers should get together and get it made from an agency which deals in Green House Nursery making.

2. Bhupender Singh, Farmer- Do we need to spray any pesticides in our fields where we have grown the transplanted plants of the nursery, since they are disease resistant.

Scientist Bharat Singh replied- It is true that the plantlets of the Green House Nursery have better resistance against diseases. Yet, they are not totally resistant to pest infestation. Therefore, the pesticides should be adequately used.

Outcomes of the initiative

- 3. Palla village now has a Green House nursery of its own.
- 4. 120 local farmers learnt about the new technology and are now reaping the benefits of the nursery.
- 5. The farmers were very enthusiastic about the nursery. They found that the seedlings of the nursery on transplantation will give a healthy produce.
- 6. Great response was received from the farmers as they had now learnt a new method which will give them disease resistant plants.
- 7. A long term partnership has been developed between the farmers and Carrefour India. The brand Carrefour resonates well with the Palla farmers.

Impact of the intervention will be judged by the following measures:

- 1. Number of farmers who transplanted the plants of the nursery into their fields.
- 2. The difference in the crop produce of the farmers who used the transplanted plants with those who used the normal plants.
- 3. Increase in the income of the farmers if they sell the plants or the seeds of the nursery.
- 4. Decrease in the crop produce as reported by the Cooperative.
- 5. Measure of any change in the income & productivity value due to Green House Nursery.

ANNEXURE

Workshop representatives

Resources (from Krishi Vigyan Kendra)

- Dr. Anjani Kumar- Programme Cordinator, KVK
- Mr. Ramsevak- Subject Matter Specialist, Vegetable
- Mr. Vishwakam, Subject Matter Specialist, Horticulture
- Mr. Bharat Singh- Subject Matter Specialist, Plant Protection

Carrefour's Representatives-

- Mr. Jean Noel Bironneau Managing Director
- Mr. Yannick Douville- Director, Fresh Department
- Mr. Franck Kenner- Director, Operations
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- Mr. Cyril Sebastian- Officer (IT), Good Works
- Mr. Mahaveer- Administration Officer, Good Works

Compere- Simran Chhatwal

Session 1- Preparation of Green House Nursery

Resource- *Mr. Ramsevak*, Subject Matter Specialist- Vegetable (KVK)

Requisitions of Nursery Management- location & layout: For nursery establishment following points should be considered:

- 1. Nursery should be raised in such place where no water stagnation is experienced and have good drainage system.
- 2. Land for nursery should be well drained and located at on a high level.

Important Components of the Nursery Planting & Management:

- Plant spacing
- Time of planting
- Transplanting stage
- Planting time and depth
- Basin preparation
- Mulching
- Irrigation
- Protection
- Aftercare
- 3. Soil should be sandy loam or loamy with PH range of 6 to 7 and rich in organic matter and free from pathogenic inoculums.
- 4. Nursery plots should be chosen near the farm building, so that frequent supervision can be made easily.
- 5. Site for nursery should be selected at such places where abundant sunshine and proper ventilation is available.
- 6. Nursery plots should be away from the shady places and should be selected at one side of the field to isolate the other fields for doing cultural practices easily.
- 7. Nursery place should be well protected from heavy rains through protected structures.
- 8. The site should be nearer to irrigation facilities and easily accessible.
- 9. The site should be protected from stray animals, snails, rats etc.
- 10. After sowing the seed in nursery, cover the seeds with mixture of well rotten compost + friable soil + sand (2:1:1) and mulch with paddy straw /dried leaves.
- 11. Mulch is removed as and when seeds just emerge above ground.

Suitable crops to grow in the nursery: In general, vegetable crops are divided into three groups based on their relative ease for transplanting.

- High value crops like beetroot, broccoli, brussels sprouts, cabbage, cauliflower, tomato & lettuce are efficient in water absorption & rapidly from new roots after transplanting.
- Vegetable crops that are moderately easy for transplanting are brinjal, onion, sweet pepper, chilli & celery which do not absorb water as efficiently as crops that are easy to transplant but they form new roots relatively quickly.
- The vegetable crops like cucurbits, sweet corn are difficult to transplant.

Session 2: Principles of Green House Nursery; the Benefits

Resource- *Dr. Anjani Kumar*, Programme Coordinator (KVK)

Present National Scenario of Green House Technology in India

Application for the green house technology for commercial purpose is in its infancy in India. The green houses which existed in 1960s were used for commercial purposes but the impetus and the much required thrust came only in the mid 1980's with the emergence of the industries manufacturing U.V. stabilized Low Density Poly Ethelene (L.D.P.E.) and the development of the indigenous technology for low cost green houses. Indian Petro Chemicals Limited (I.P.C.L) was one of the foremost industries operating in collaboration with the agricultural scientists in this field. In 1985, Indian Agricultural Research Institute (I.A.R.I) designed and set up green house at Leh (J&K). Today there are more than 1840 small and medium sized greenhouses at Leh.

Farmers are also utilizing low and medium cost greenhouses for raising potted plants and seedlings in the nursery. In the Northern Gangetic plains especially in Punjab, Haryana and Uttar Pradesh, the farmers are using this technology to raise healthy seedlings of high yielding crop varieties so that they can be transplanted early in the fields during the onset of the spring season so as to capture the early markets and thus reap higher returns.

In the North Eastern states, especially in Assam, efforts are on to raise vegetable crops in the greenhouse-cum-Rain Shelter Structures during the long south west monsoon periods. In these regions stress is being given for the development of low cost greenhouses using bamboo frame structures as these construction materials are readily available in these regions. The results obtained in this regard from the concerned agricultural universities are encouraging.

Benefits of Green House Nursery to farmers:

- 1. In India, seed production in vegetables is the limiting factor for cultivation of vegetables.
 - The vegetables require specific temperature and other climatic conditions for flowering and fruit setting.
 - Seed production of brinjal, capsicum, cauliflower and broccoli is very difficult in open conditions.
 - To reduce such micro climatic condition a protected environment is essential. So, the seed production of highly remunerative crops namely tomato, capsicum and cucumber should be performed under protected environments.
 - The maintenance and purity of different varieties/lines can be achieved by growing them under greenhouse without giving isolation distance particularly in cross-pollinated vegetables namely onion, cauliflower and cabbage.

- Hence, vegetable production for domestic consumption and export oriented in low and medium cost greenhouse is an innovative technique for Indian farmers in the modern times.
- Such production system has not only extended the growing season of vegetables and their availability but also encourage conservation of different rare vegetables.
- 2. Seedlings not only reduces the crop span but also increases the uniformity of the crop and thus, harvesting as compared to direct sown crops. Transplanting of seedlings also eliminates the need for thinning and provides good opportunities for virus free vigorous and off-season nursery, if grown under protected conditions.
- 3. It is easy and convenient to manage seedlings under small area.
- 4. Effective and timely plant protection measures are possible with minimal efforts.
- 5. Nursery provide favourable climate to emerging plants for their better growth and development.
- 6. Effective input utilization for crop production by reducing initial stage crop infestations and interferences.
- 7. Seed cost of some crops like hybrid vegetables, ornamental plants, spices and some fruits can be economized through nursery.
- 8. Nursery production help in maintaining effective plant stand in shortest possible time through gap fillings.

The state of Himachal Pradesh annually earns more than Rs.25 billion (Rs.2,500 crore) from the cultivation of fruits and vegetables. The cultivation of exotic vegetables and flowers in polyhouses has added prosperity of the growers. Similarly, Palla farmers through Green House Nursery can gain a status of commercial venture where retailers can also sell planting materials to the general public, wholesale nurseries and to commercial landscape gardeners, and the sales can also be made to private nurseries which supply the needs of institutions or private estates.

Session 3- Flower & Horticulture Nursery

Resource- Mr. Vishwakam, Subject Matter Specialist- Horticulture (KVK)

Ideal Nursery Layout:

- 1. Nursery is the place where all kinds of plants like trees, shrubs, climbers etc. are grown and kept for transporting or for using them as stock plants for budding, grafting and other method of propagation or for sale.
- 2. The modern nurseries also serve as an area where garden tools, fertilizers are also offered for sale along with plant material.
- 3. There are some important components which should be taken into care and provision should be made for these during planning and layout preparation for nurseries:
- a) **Fence:** Prior to the establishment of a nursery, a good fence with barbed wire must be erected all around the nursery to prevent tress pass of animals and theft. The fence could be further strengthened by planting a live hedge with thorny fruit plants (like Koranda). This also adds beauty in bearing and also provides additional income through sale of fruits and seedlings obtained from the seed.
- b) **Roads and paths:** A proper planning for roads and paths inside the nursery will not only add beauty, but also make the nursery operations easy and economical. This could be achieved by dividing the nursery into different blocks and various sections. But at the same time, the land should not be wasted by unnecessarily laying out of paths and roads. Each road/ path should lead the customer to a point of interest in the nursery area.
- c) **Progeny block/ Mother plant block:** The nursery should have a well-maintained progeny block or mother plant block/scion bank planted with those varieties in good demand. The grafts/layers/ rooted cuttings/ seedlings should be obtained preferably from the original breeder /research institute from where it is released or from a reputed nursery. One should remember that, the success of any nursery largely depends upon the initial selection of progeny plants or mother plants for further multiplication. A well managed progeny block or mother plants block will not only reduce the cost of production but also increases the success rate of grafting/ budding/layering because of availability of fresh scion material throughout the season within the nursery itself and there will not be any lag period between separations of scion and graftage.
- d) Irrigation system: Horticultural nursery plants require abundant supply of water for irrigation, since they are grown in polybags or pots with limited quantity of potting mixture. Hence sufficient number of wells to yield sufficient quantity of irrigation water is a must in nurseries. In areas with low water yields and frequent power failures, a sump to hold sufficient quantity of water to irrigate the nursery plants is also very much essential along with appropriate pump for lifting the irrigation water. In areas where electricity failure is a problem which is more

common, an alternate power supply (generator) is very essential for smooth running of pumpset.

- e) Stores: A store room of suitable size is needed for storing polybags, tools and implements, packaging material, labels, pesticides, fertilizers etc. should be located at a place which offers supervision.
- f) Seed beds: are essential to raise the seedlings and rootstocks. These are to be laid out near the water source, since they require frequent watering and irrigation. Beds of 1-meter width of any convenient length should be made. A working area of 60cm between the beds is necessary. This facilitates ease in sowing of seeds, weeding, watering, spraying and lifting of seedlings.
- g) **Nursery beds:** should also have a provision to keep the grafted plants either in trenches of 30cm deep and 1 m wide so as to accommodate 500 grafts / layers in each bed. Alternatively, the grafts/ layers can be arranged on the ground in beds of 1 m wide with 60cm working place in between the beds. Such beds can be irrigated either with a rose fitted to a flexible hosepipe or by overhead micro sprinklers.
- h) **Potting mixture and potting yard:** For better success of nursery plants, a good potting mixture is necessary. The potting mixtures for different purposes can be prepared by mixing fertile red soil, well rotten FYM, leaf mold, oil cakes etc. in different proportions. The potting mixture may be prepared well in advance by adding sufficient quantity of superphosphate for better decomposition and solubilization. The potting mixture may be kept near the potting yard, where potting/pocketing is done. Construction of a potting yard of suitable size facilitates potting of seedlings or grafting/ budding operations even on a rainy day.

Planting should always be initiated early in the morning to limit stress on the plantlets and also to allow sufficient time for adaptation (from the plastic bag to the soil). Bags should be removed with care and the plant, with most of its surrounding substrate needs to be planted carefully. The planting depth is critical because the "heart" of the plant should never be covered with water. Once the plant is covered with water the growing point starts rotting and the plant dies off. If a plant is planted too shallow, its roots will desiccate and die.

Session 4- How to protect a Green House Nursery

Resource- Mr. Bharat Singh, Subject Matter Specialist- Plant Protection (KVK)

Water Management:

- 1. Water is an important resource. By reducing water use, the possibility of leaching and loss of nutrients through surface runoff decreases.
- 2. Micro, Overhead and pulse irrigation method are very means of watering larger nursery area.
- 3. Apply small amounts of water to the root zone area only. It also promotes compact root development which is important for subsequent tree survival in the landscape.

Nutrient Management:

- 1. Nursery growers should test soils/media each year (midsummer to fall) to determine fertilizer/organic manure needs for nursery beds for the following year.
- 2. Usually in nursery beds normal fertilizers like urea, Muraite of Potash and DAP are applied. Timing of fertilization should be given in two spilt i.e. basal and top dressing (after 10 days) by broadcasting or foliar spray @ 0.5-2%.
- 3. Immediate before transplanting, fertilization should be avoided as it encourages diversion of plant energy toward root development in nursery which has negative impact on seedlings during exposure for transplanting.
- 4. Common source of nutrients in nursery is FYM, compost, vermicompost, leaf mold, cakes etc. Besides, primary nutrients like nitrogen and phosphorus are essentially applied through straight fertilizers as these play an important role in root and shoot development.

Weed management:

- 1. The presence of weeds in nursery increases competition with seedlings for nutrient, water, light and CO2 results in lanky seedlings.
- 2. Some weeds harbour pathogens and insects and also produce allelopathic effect on crop plants. Therefore, weed control is very essential requirement for successful nursery production.
- 3. It should be integrated, combining the use of mechanical, cultural and as necessary, chemical controls. The following methods control weeds in either a nursery field or container crop:
- Select a weed-free field or media for nursery preparation.
- Control weeds in perimeter areas (i.e. fence rows and windbreaks).
- To reduce weed seeds, properly store and compost manure before applying to the soil.
- Mow buffer strips to reduce seeds blown into irrigation ponds.
- Ensure weed-free material is planted.
- Do not move weeds between fields on equipment.
- Cultivate fields when seedlings are small.
- Use shallow tillage (2.5-5.0 cm) if herbicide has been applied.

Disease Management:

- 1. In nursery beds usually fungal diseases like damping off and foliar diseases like anthracnose, blight, leaf spot and mildews are serious problems.
- 2. Their control is possible only through adopting an integrated approach of cultural, mechanical, biological and chemical measures right from management of seed source to final uprooting seedlings.
- 3. Damping off disease caused by several fungi has been found a common & major problem in the Green House Nursery. The bacterial blight incidence in nursery has been found to reduce plant population from 12 to 56 %.
- 4. Soil and seed treatments with bioagents are the best feasible methods for the management of soil borne diseases.
- 5. Organic amendments, green manuring, congenial moisture and moderate weather conditions are the best situation to establish bioagents in the soil.

Pest management:

- 1. Insect and disease control poses many challenges because of the variety of plants in the nursery.
- 2. Good sanitation and plant health reduce pest and disease problems.
- 3. Mapping the nursery by identifying plants which are most susceptible to insects and disease problems.
- 4. Note which species and cultivars are affected first.
- 5. Monitoring nursery at least once a week. Pay particular attention to sensitive species
- 6. Conserve and promote beneficial insects by promoting their captive rearing and releasing in protected area.
- 7. It is necessary to maintain vigorous, healthy plants by using proper culture and management practices to provide natural resistance to plants.
- 8. Heavily insect infested or injured plants should be destroyed as earliest possible.

Temperature and humidity regulation:

- 1. In humid tropical climatic regions erratic rains create excess moisture and relative humidity in nursery beds which is congenial for various diseases and pests.
- 2. The temperature can be controlled with three different methods i.e. ventilation, shading and intermittent misting or sprinkling.
- 3. Special structures are required for protection of young and tender plants from heavy rainfall.
- 4. The structures with proper ventilation from all side should be constructed for natural regulation of excess temperature and humidity.

Carrefour's Green House Nursery in Palla Village



Carrefour members discuss the suitability of Green House Nursery from Palla farmers



Palla farmers raising their doubts regarding the Green House Nursery to the scientists



Experienced agricultural scientists formed the panel

