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Technologies

राष्ट्रीय लीची अनुसंधान केन्द्र

NATIONAL RESEARCH CENTRE ON LITCHI

Mushahari, Muzaffarpur, Bihar – 842 002

NRCL-EB-11

NRCL

Technologies for Business ventures in Litchi and Allied Sector

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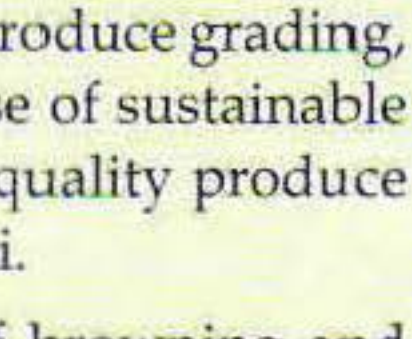
PREFACE

Litchi is an introduced crop in India which has been brought to Indian subcontinent in 18th Century. In last 200 years, the litchi has progressed and area in the country has gone up considerably. The production and productivity of the crop has been improved and presently acquired an important position in Horticulture scenario of the nation. The major growth in litchi took place in the last two decades after inception of NRC on Litchi at Muzaffarpur, the nation's prime litchi growing hub and still the pace is continuing mainly because the systematic research work has been initiated at NRC on Litchi. The Centre has been able to develop technologies to overcome the production and Post-harvest related problems in this crop. The major science initiative and science lead technologies which has impacted the growth of litchi in country has been enumerated.

- The genetic base of litchi has been widened through clonal selection, chemo-taxonomy and morphological vis-a-vis molecular characterization. An understanding of genetic behaviour of this crop has also been developed which has helped in maintenance of more than 50 elite types in Field Gene Bank. Presently, the Centre has strength of variable germplams with early and late maturity, small and larger fruit type, nutrient responsive and wider adaptable varieties. The hybridization programme in litchi has resulted into various potential progeny lines of beneficial use.
- The role of honey bees in enhancing the production has been quantified which has demonstrated into 20-30% yield enhancement, hence the provision of sufficient bee boxes in the orchard (10-15 boxes of 9-10 frame/ha) has been suggested to the orchardists. The basic information pertaining to peak hours of honey bee visit, protective sprayers during flowering and fruit set has been developed.
- To maintain the true-to-type plants for commercial orcharding of litchi, the vegetative propagation protocol has been standardized with all the basic [scientific] information like rooting behaviour, secondary root formation and proliferation, root: shoot ratio for improved survival, season of propagation, potting medium, etc. Lately, the principle behind union of cambium have been established for wedge grafting to use root stocks in litchi for area expansion even in marginal and non-traditional belt.

- ❖ Basic knowledge on abscission layer formation at peduncle of young developing fruits during stress has been developed by the centre and the use of auxins to encounter such adverse effect has been standardized to check the early fruit drop and improve the production.
- ❖ The Scientific reasons for fruit peel plasticity, colour development, role of micro nutrients for checking peel splitting and improved peel colour for production of quality litchi fruits for domestic and international market has been confirmed.
- ❖ Quantification of coppicing capacity, light requirement for efficient photosynthesis, rebuilding canopy architecture has been developed after rejuvenation of old litchi orchards.
- ❖ The canopy architecture development through angling of 0, 1st, 2nd and 3rd order branches, Centre opening for maximum solar light interception and medium and high density planting has improved yield per unit area output from the same input and thus, improved input use efficiency and enhanced factor productivity of litchi plantations.
- ❖ Role of microbial association in root rhizosphere of litchi plants, their qualitative and quantitative analysis has opened up new hope for area expansion under litchi crop in non-traditional areas.
- ❖ Standardization of maturity indices, quantification of losses at various stages after harvest, right stage and time of harvesting, produce grading, removal of field heat, maintenance of cool chain and use of sustainable packaging system has made a considerable impact on quality produce delivery to consumers and minimization of losses in litchi.
- ❖ The profiling of aroma, pulp processing, path way of browning and dehydration of whole nut/aril, optimum temperature for yeast growth and development for fermented beverage (litchi wine), etc has been developed which has improved the quantum of processing in litchi fruits.

In nutshell, all these technologies have improved the area coverage, production's quantum and reduced the post harvest losses in litchi however, some of the most important and farmer's friendly technologies has been presented in the bulletin. The team work of all the Scientists, staff members and project personals is greatly appreciated and acknowledged.



Vishal Nath
Director

REJUVENATION OF UNPRODUCTIVE LITCHI TREES 1

1. **Description of technology:** Rejuvenation of old, senile and unproductive litchi trees for better productivity and quality without disturbing the original plantation through heavy reiterative pruning and other cultural practices.
2. **Area of application:** Improving productivity of old, senile and unproductive litchi trees.
3. **Procedures/methodology:** Steps involved in the rejuvenation process are

Selection of trees/ orchard

↓

Reiterative pruning
(at 2.0-2.5m height during August-September)

↓

Application of copper fungicide at cut ends

↓

Application of manures and fertilizers to plant basin

↓

Thinning of sprouts and canopy development

↓

Intercropping with suitable crops at orchard floor

↓

Periodic irrigation and plant protection measures

Old senile litchi orchard

Reiteratively pruned litchi tree

Sprouts emerging from cut branch

4. **Equipment and material required:** Power operated pruning saw, Telescopic pruner, Secateurs, fungicide, manures and fertilizers, seeds of crop for inter cropping.
5. **Likely operational cost of technology:** Rs. 25,000/ha/year.

View of reiteratively pruned orchard

Developing canopy in rejuvenated tree

Bearing in rejuvenated tree after 3rd year

6. **Risk/Opportunities involved in adopting the technology:**
   Risk: Uncare and casual approach after rejuvenation may lead to death of trees.

   Opportunities: Vigorous plant growth and enhanced quality production due to rebuilding of canopy, good fuel wood from pruned branches, better inter crop on orchard floor.
7. **Performance results:**
   i. Quality bearing starts after third year of rejuvenation and reaches to maximum up to 80-100 kg/tree after full growth and development.
   ii. Additional income from sale of pruned wood.
   iii. Additional income from intercrops grown in the orchard.
   iv. Quality improvement from 22.35% to 42.85% (under extra class)
8. **Technology Innovator:** Dr. Rajesh Kumar, Principal Scientist (Hort.), NRCL, Muzaffarpur, Bihar.

2 OFF SEASON PROPAGATION IN LITCHI

1. **Description of technology:** Off season (spring) approach for raising the air layered litchi planting materials through temperature regulation and selection of non-bearing twigs of desired thickness.
2. **Area of application:** Production of quality plants in litchi.
3. **Procedures/methodology:** The off season air layering during Spring (Feb.-March) on selected shoots (1.0-1.5 cm diameter and 45-50 cm length), with proper root hormone (5000 ppm IBA) application at ringed portion and tying with proper rooting medium (enriched soil and moss grass). The maintenance of high relative humidity (90%) and medium temperature (17-20°C) through covering the entire mother plant with polythene sheet and periodic watering of the trees.

Poly cover on mother plant during night

Open ventilation during day time

4. **Equipment and materials required:** White polythene sheet, secateurs, grafting knife, polythene wrappers, water sprayer, IBA, moss grass, enrichad soil.
5. **Likely operational cost of technology:** Rs. 640/100 units (Cost: benefit ratio – 1:3.52) in 2008 and Rs. 2145/100 plant in 2012.
6. **Risk/Opportunities involved in adopting the technology:** **Risk:** Spring season is time of reproductive phase and the environment has low temperature and humidity which may lead to poor success. Plant can be prepared and plants needs less time in nursery.

Off season air layers ready for shifting

Potting of air layers in the shed

Hardening of air layers in the shed net

Opportunities:

- Early and hastened rooting as compared to main season process
- Reduced nursery period and maintenance cost
- Continued availability of planting material
- Better survivability and high benefit: cost ratio
- Ready for field plantation within six month time

7. **Performance results:**
   - Good quality planting material
   - Better rooting (thickest, healthiest and short roots)
   - Quick establishment and high survibility in the field
   - Low gestation and maintenance period
8. **Technology Innovator:** Dr. Rajesh Kumar, Principal Scientist (Hort.), NRCL, Muzaffarpur, Bihar.

POTTING MEDIA FOR RAISING HEALTHY PLANTS 3

1. **Description of technology:** Field survival of air layers is poor on account of scanty growth of secondary roots leading to weak planting materials in nursery. Well rooted air-layers after detaching from the mother plants require proper care for their survival firstly, in the nursery and later, in the field. The survival of layers depends on the quality of roots and growth of sapling. The use of proper potting mixture containing base material [River bed soil: Vermi-compost (1:2)] + vermiculite (50g/kg) + cocopith (50g/kg) + DAP 5g/kg has been found highly effective in production of more secondary roots and vigorous planting materials leading to higher survival (up to 75%) in the nursery.

Air layering in mother plants

2. **Area of application:** Production of quality planting materials of litchi.
3. **Procedures/ methodology:** The process starts from August with air layering on mother trees and rooted air – layers are detached and planted in enriched medium as per flow chart in 1st week of October.

Air layering on mother plants
↓
Detachment of rooted air layers
↓
Defoliation of leaves
↓
Removal of polythene from root ball
↓
Filling of root ball cracks with thick slurry of clay soil + vermicompost
↓
Preparation of potting mixture (River bed soil + Vermicompost + Cocopith + Vermiculite + DAP)
↓
Filling of potting mixture in polybags
↓
Planting of air layers
↓
Maintenance in Nursery

4. **Equipments/ materials required:** Mother plants of selected cultivars, grafting knife, secateur, rooting media, polythene sheet.

Detached air layers

Root balls filled with clay before planting

Preparation of potting media

Comparison of root development in improved potting medium (Left) with control

Large scale healthy plants production of with improved potting media.

nursery bag, shade net with mist facility, vermi-compost, vermiculite, coco-pith and good quality riverbed soil, etc.

5. **Likely operational cost of technology:** Unit cost of production Rs. 2145/100 number of gooties (C:B ratio = 1:1.86)
6. **Risk/Opportunities involved in adopting the technology:** No risk only protection from chilling winter is required. Need based plant protection measures to be done. Mortality of plants in may be up to 20-30 per cent over a period of 8-9 months.
7. **Performance result :**
   - Healthy and vigorous growth of litchi air-layered (height, number of leaflets) plants.
   - Better establishments of air-layers due to profuse root development.
   - Comparatively higher survival of air-layers in nursery (75%) and field conditions.
8. **Technology Innovators:** Dr. Amrendra Kumar, Senior Scientist (Hort.) and Dr. S.D. Pandey, Principal Scientist (Hort.) NRCL, Muzaffarpur, Bihar.

4 POST CUT DIP SOLUTION TO ENHANCE NURSERY SURVIVAL

1. **Description of technology:** Survival of air layers initially in nursery and later in field is a problem due to development of brittle primary and less secondary roots. The dip solution formulation help improves root mass, root characteristics and thereby enhances the nursery survival up to 90 per cent.
2. **Area of applications:** Production of healthy plant materials in nursery.
3. **Procedure/ Methodology:** Procedures involve in preparation of dip solution and its use on freshly cut air layers. The detailed steps involved are given in flow chart.
4. **Equipment required:** Secateur, Plastic bucket, well rooted air layers, poly bags, Rhizobacterial formulation,

Freshly cut litchi air layers

Dissolving 10 ml Rhizobacteria/liter of normal water

↓

Steering the solution to make it uniform

↓

Cutting of healthy gooties from mother plants

↓

Removal of polythene from the root ball carefully

↓

Dipping the root ball in to solution for 3-5 minutes

↓

Planting of treated air layers in well filled poly bags (The bags should be filled with standard mixture of river bed soil + vermicompost + cocopith + Vermiculite + DAP)

↓

Irrigation of plants and maintenance in nursery

↓

Drenching of plant's pot/poly bag with 1% Rhizobacteria solution after 30 days of planting

↓

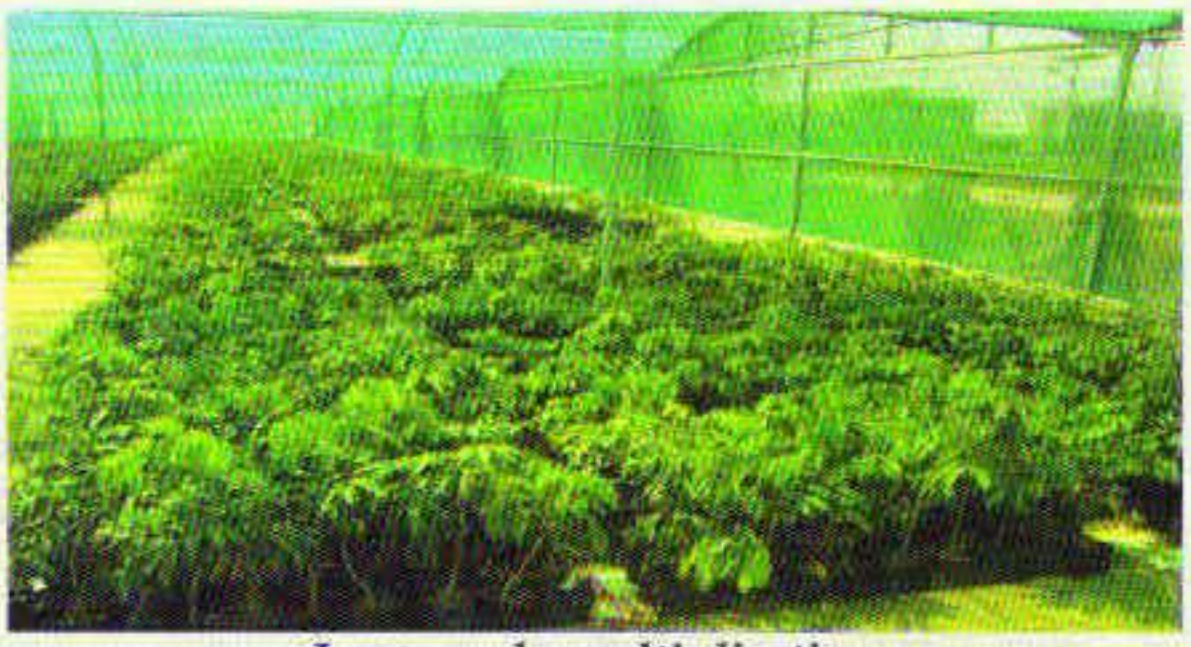
Normal maintenance in nursery

Air layers showing primary root development

Dipping of air layers in Rhizobacteria solution

Healthy plants after 10 months

Comparison of secondary and tertiary root development in treated air layers with Rhizobacteria (Right)



Large scale multiplication of healthy litchi plants with improved survival

Sprayer, Agro shade net house, insecticides, river bed soil, vermicompost, vermiculite, Coco pith.

5. **Likely operational cost of technology:** With additional cost of Rs. 2.00 on 100 plants, 15% more survival in nursery can be obtained which will give direct additional income of Rs. 600 per 100 plants (C:B ratio 1:2:29) apart from better root system and enhanced field survival.
6. **Risk/Opportunities involved in adopting the technology:** No risk in technology. Higher field survival and improved vegetative growth of plants in fields.
7. **Performance Result:**
   - Healthy plant with high chlorophyll content.
   - Profuse primary and secondary root.
   - Improved survival of plants upto 90 per cent.
8. **Technology Innovators:** Dr. Amrendra Kumar, Senior Scientist (Hort.), and Dr. S.D. Pandey, Principal Scientist (Hort.), NRCL Muzaffarpur, Bihar.

5 LITCHI BASED CROPPING SYSTEM MODELS

1. **Description of technology:** In young developing litchi orchards, 80 per cent area remain vacant up to 5 years which gradually decreases as the plant growth increases. The technology for litchi based cropping model aims to utilize vacant space with suitable and need based short duration crops which has synergistic effect on litchi plant growth and root rhizosphere. A set of crops (2 model) has been described for sandy loam soil conditions.

Banana as intercrop in litchi orchard

Model I: Litchi + 2 rows of banana (1 main + 2 ratoon crops)

Model II: Litchi + high value crop in 80% area (crop sequences are Okra-Gladiolus; Cowpea-Potato-Onion; Cowpea-Frenchbean-Okra)

Model I	Model II
Land preparation	Land Preparation
↓	↓
Pit digging for Banana	Making strip for litchi plants
↓	↓
Pit filling with good substrate	Sowing of crop in interspace
↓	↓
Planting of banana	Crop management
↓	↓
Crop management	Harvest at proper stage
↓	
Bunch harvest	
↓	
Maintenance of ratoon	

2. **Area of application:** Litchi production - Enhancing income from newly established litchi orchard and soil health management.
3. **Procedures/Methodology:** Given in flow chart.
4. **Equipments/materials required:** Banana plants, crop seed, manure and fertilizers, pesticide sprayers, farm implements.

Gladiolus as intercrop

Okra as intercrop

Cowpea as intercrop

Potato as intercrop

French bean as intercrop

5. **Likely operational cost of technology:**

   Model I: Approx. Rs. 25,000/ha for main crop and Rs. 12,000/ha for each ratoon crop (C:B ratio-1:5.1)

   Model II: Approx. Rs 20,000/ha (C:B ratio-1:4.0).

6. **Risk/Opportunities involved in adopting the technology:** There is no risk. However, there will be additional benefit by growing intercrops as compared to sole litchi plantation and there is no allelopathic and adverse effect on main crop.

7. **Performance result:**

   A. **Model I: Litchi-Banana** showed its potentiality and suitability for consecutive three years with total fresh yield of 36, 28 and 18.2 tones / ha of banana fruits as main crop, 1st ratoon and 2nd ratoon, respectively.

   B. **Model 2: Okra- Gladiolus** crop rotation is the best in terms of net return and plant growth followed by **Cowpea-Potato-Onion** and **Cowpea-French bean-Okra** with a net profit of Rs. 1,42,694.00, Rs. 93,180.00 and Rs. 43,668.00/ha, respectively up to 3rd year.

6. **Technology Innovators:** Dr. Amrendra Kumar, Senior Scientist (Hort.) and Dr. S.D. Pandey, Principal Scientist (Hort.), NRCL, Muzaffarpur, Bihar.

Field view of bagged fruit bunches

Bagging improves colour and quality of fruits

Export quality fruits of CV. Shahi after bagging

6. **Risk/Opportunities involved in adopting the technology:** No risk, only protection from strong wind and rains is required. Need based protection measures to be done.

7. **Performance result:** The performance of bagged fruits was found better in all the quality parameters as compared to unbagged fruits.
   - Bagged fruits have about 34% less cracked and spotted fruits
   - 30% higher Class I fruits in bagged bunches has been recorded

8. **Technology Innovator:** Dr. S K Purbey, Senior Scientist (Hort.), NRCL, Muzaffarpur, Bihar.

7

BIOINTENSIVE MANAGEMENT OF FRUIT BORER COMPLEX IN LITCHI

1. **Description of technology:** Fruit and seed borer is a major pest of litchi. Several species of *Conopomorpha* damage litchi fruits. An eco-friendly technology has been developed which involve placement of bio-control agent in orchard and spray of organic and plant based products on developing fruits.

Infestation of fruit borer in developing fruits

Infestation of fruit borer in mature fruits

2. **Area of Application:** Plant health management-Production of healthy and chemical free litchi fruits.

3. **Procedure/ Methodology:** Given in flow chart.

Setting of pheromone traps (12-15 no./ha) at 10-12 ft/mid canopy height in last week of January and replacing the lure after 25 days

↓

Application of Trichocard (*Trichogramma chilonis*) @ 50,000 eggs/ha before panicle emergence and flowering

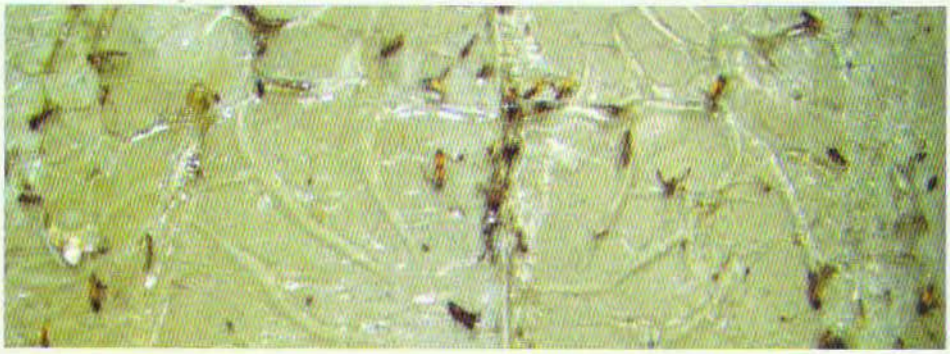
↓

Spray of Kamdhenu Keet Niyantrak (5%) or Vermiwash (5%) + Neem oil @ 4 ml/l water or neem based pesticides (*Azadirachtin* formualtion) at manufacturers' recomended dose just after fruit set

↓

Repeat the spray twice just before colour break at weekly interval (Last week of April-first of May depending on cultivar)

4. **Equipment and materials required:** Trichocard, Kamdhenu Keet Niyantrak, Vermiwash, neem oil, neem based commercial formulation, pheromone trap and lures, sprayer, bamboo/iron pole and ladder.



Adult insects trapped on sticky surface of trap

Larvae of fruit borer on ripen fruits

Pheromone trap installed in litchi orchard

5. **Likely operational cost of technology:** Rs. 9600/- per hectare for sprays including input cost and Rs. 6000 per hectare for pheromone trap and lure.
6. **Risk/Opportunity involved in adopting technology:** Technology will not cause any adverse effects on environment and human life and will lead to increase in population of predators and parasites.
7. **Performance Results:** The technology has been effective in holistic approach for IPM in Litchi but need further refinement for phenomones of new insect species.
8. **Technology Innovators:** Dr. K.K. Kumar (Ex-Director and Entomologist) and Dr. Amarendra Kumar, Senior Scientist (Hort.), NRCL, Muzaffapur, Bihar.

IPM OF LITCHI MITE 8

1. **Description of technology:** An integrated management package has been developed for litchi mite (*Aceria litchi*) which is one of the important pests of litchi. This involves timely mechanical and chemical control measures.
2. **Area of Application:** Plant health management-Healthy litchi orchard.
3. **Procedures/ Methodology:** Given in flow chart.
4. **Equipment materials required:** Sprayer, secateurs, recommended pesticide.
5. **Likely operational cost of technology:** 6000-7500/per hectare including input cost, cost of spray and pruning/cutting cost.

Initial infestation of mite

Mite affected twig

Examine the plants for affected branches/leaves at least thrice in a year. June (after harvesting fruits), September and February (before flowering)

↓

Cut the affected leaves and shoots along with some portion of healthy parts and destroy it by burning

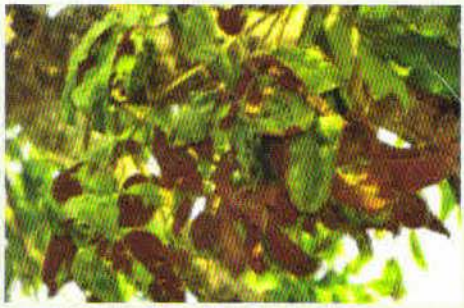
↓

Spray the affected plants twice with Dicofol (0.15%) or Propargite (0.15%) or Dimethoate (0.05%) during June-July, September-October and February depending upon intensity of infestation

↓

Need based application of miticide just after pruning

View of mite



Advance stage of mite infestation

Whole litchi plant affected with mite

6. **Risk/Opportunity involved in adopting the technology:** IPM of litchi mite is highly beneficial to get quality yield as this is very devastating pest causing severe loss of trees and production.

7. **Performance Results:** The technology has been found very efficient in maintaining good orchard health and increased overall production of fruits.

8. **Technology Innovators:** Dr. K.K. Kumar, (Ex-Director and Entomologist), Dr. Amrendra Kumar, Senior Scientist (Hort.) and Dr. Vinod Kumar, Senior Scientist (Plant Pathology), NRCL, Muzaffapur, Bihar.

PRODUCTION OF WINE FROM LITCHI FRUITS 9

1. **Description of Product/ Technology:** Wine is sparkling red in colour with typical aroma of litchi and acidic taste but with low in alcohol content. In organoleptic evaluation the litchi wine has been rated quite acceptable as an alcoholic beverage and superior to commercial grape wine in taste and flavour, which might be due to inherent rosy fragrance. It has natural anti-oxidant (anthocyanin) property and around 10-12% alcohol content.

Process of development of Litchi wine

2. **Area of application:** Post-harvest Management and Value addition in litchi.
3. **Procedures/Flow chart of technology:** The process for production of litchi wine is given in flow chart.
4. **Equipments/material required:** Litchi fruits, yeast, citric acid, sugar, clearing agent, preservative, pH meter, refractometer, tanks/ vessels, pneumatic press, Crusher, distemmer filtration unit, bottling unit, etc. alongwith space of 30x30 mts.

Selection of fruit

↓

Extraction of juice (Free from microbes)

↓

Addition of wine yeast

↓

Filtration and racking

↓

Fining and filtration

↓

Aging (Maturation)

↓

Packing

↓

Labeling

Finished product

5. **Cost of technology/infrastructure:**

a) **Plant setup cost:** Rs. 10.0 lakh (up to 1000 litre capacity), Rs. 1.0 crore (up to 1.0 lakh litre Capacity)

b) **Raw material and production cost:** Rs. 120/ 750 ml wine. However the cost of wine production varies with the established capacity (Fixed cost) and material used (litchi variety, type of bottle used, cork- capsule/plastic, caps and label). The next major and most important component of wine making is the wine maker and taster.

6. **Risk/Opportunity involved in adopting the technology:** The adoption of technology needs wine policy from local government and assured supply of raw material from production catchment. Surplus produce and lower grade fruits/cracked fruit with good quality pulp can be used for wine production.

7. **Performance Results:** The wine is highlely acceptable with good taste and nutritive value.

8. **Additional information in terms of economic benefits over conventional technology:** Litchi fruits are highly perishable and short duration crop. Therefore, value addition in form of litchi wine, which has tremendous international and domestic markets, will provide scope for utilization of surplus produce and minimization of post harvest losses. There is no such technology available in India.

9. **Technology Innovator:** Dr. S.K. Purbey, Senior Scientist (Hort.), NRCL, Muzaffarpur, Bihar.

PRODUCTION OF NUT FROM LITCHI FRUITS 10

1. **Description of Technology:** Fresh Litchi fruits are available for very short period which can be made available round the year in form of dehydrated whole fruits called 'Litchi Nut'. To develop the product, well mature freshly harvested fruits are sorted, cleaned and then sequentially dehydrated in shade, sun, and finally in cabinet tray drier (50°C) to get good quality litchi nut. Pre-treatments of the fruits with sulphur (KMS) and citric acid are done uniformly before drying to maintain the colour and quality of product.
2. **Area of application:** Post-harvest management and value addition in litchi.
3. **Procedure/Flow chart of technology:** The steps involved in preparation of Litchi Nut is given in flow chart.

4. **Equipments/material required:** Litchi fruits, preservative, citric acid, Sun/electrically-operated dryer, SS vessels, weighing scales, sealing machine and one gas-fired furnace along with space of 50 m^2.
5. **Cost of technology:**

a) **Plant set up cost:** 3.0 lakh

b) **Raw material cost**: The cost of raw material is variable (Rs. 200-300 for one kg finished product) however, the production cost Rs. 15-20 per kg Litchi nut will be added to total finished product cost.

6. **Risk/Opportunity involved in adopting technology:** There is no risk in adoption of technology if the protocol is properly

Dehydrated Litchi Fruits in form of Litchi Nut

Peeled Litchi Nut

Solar Drier used for preparation of Litchi Nut

followed religiously. The surplus produce can be utilized and the litchi can be made available in dehydrated form round the year.

7. **Performance Results:** The Litchi nut is highly acceptable product but needs promotion in Indian market.
8. **Additional information in terms of economic benefits over conventional technology:** Litchi fruits are highly perishable and short duration crop. Therefore, dehydrated product like nut will be very beneficial which has shelf life of 10-12 months. Technology is very simple and product is in high demand.
9. **Technology Innovator**: Dr. S.K. Purbey, Senior Scientist (Hort.), NRCL, Muzaffarpur, Bihar.

INSTITUTE TECHNOLOGY MANAGEMENT UNIT (ITMU)

ITMU is a novel initiative taken by ICAR, under NAIP project, to utilize the strengths and innovative potential of the institute for the benefit of the society through commercialization of technologies, development of business potential and partnership with private sector. Commercialization of R&D products, innovation and diffusion of new and improved technology is the main agent of industrial, economic and social development. Immense business opportunities lie hidden in technologies and knowledge created at Agriculture Research Institutions/Centres.

Structure:

According to the ICAR guidelines for Intellectual Property Management and Technology Transfer/Commercialization, an effective three tier mechanism for IP management and technology transfer has been laid down.

- ATMC (Agro-Technology management Centre) at the ICAR Headquarter, New Delhi
- ZTMCs (Zonal Technology Management Centres) in the five defined zones
- ITMUs (Institute Technology Management Units) are created in the respective institute /centre headed by the respective Director of the institute/centres.

Our centre comes under ZTMU, National Institute of Research on Jute and Allied Fibre Technology, Kolkata - 700 040 which have Business Planning & Development Unit (BPD Unit). It is a type of technology business incubation drive designed for agricultural sector to promote entrepreneurs with the help of the vast research and development facilities and knowledge available with ICAR institute/centres in East and North East India. The ICAR through the NAIP aims to develop the R&D system to find new ways of doing business in agriculture and allied sectors to achieve the objectives of increased productivity, poverty alleviation, nutritional security, livelihood and generation of employment.

हर कदम, हर डगर
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