

Horticulture

EXPERIENTIAL LEARNING

1. Concept

The concept of EL is not really new. It was there in our culture much before the formal education existing today. During the Gurukul Era, the Shishyas (Students) learned the education by actively indulging in various activities under the supervision of the Guru (Maestro) and not just memorizing it for passing in the examinations. Experiential education is a philosophy and methodology in which educators purposefully engage with learners in direct experience and focused reflection in order to increase knowledge, develop skills and clarify values.

Although, the present education system in Agricultural Universities focuses on hands on experience, their skill and knowledge capabilities do not fill the requirements of the growing private sector. They are unable to become true professionals who can analyze the real life situation and manage field problems by providing appropriate solutions and become confident in taking up self-employment. This demands to build practical skills and entrepreneur spirit among the students besides preparing them with analytical concepts.

The word 'experiential' essentially means that learning and development are achieved through personally determined experience and involvement, rather than on received teaching or training, typically in group, by observation, listening, study of theory or hypothesis, or some other transfer of skills or knowledge. Experiential learning is a business curriculum related endeavor which is interactive (other than between teacher and pupil).

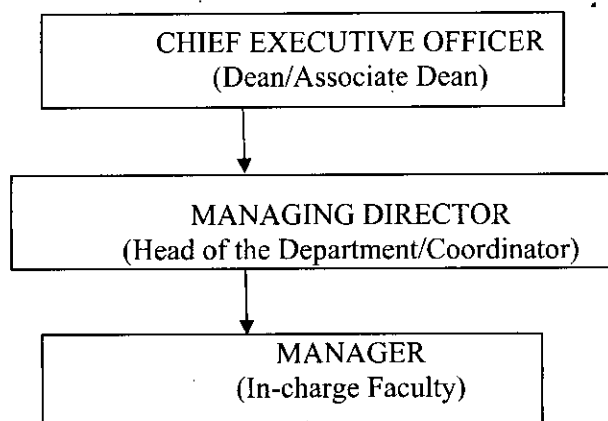
EL is for building (or reinforcing) skills in leadership and decision-making, individual and team coordination, approach to problem solving and resolving conflicts, etc. The degree of difficulty in this situation is very high and individuals and teams are encouraged to set and achieve stretch goals. Carefully calibrated activities move participants to explore and discover their own potential. Both activities and facilitation play a critical role in enhancing team performance back at the workplace.

2. Objectives

EL provides the students an excellent opportunity to observe, think, analyse, synthesize, evaluate and apply the acquired knowledge. It promotes entrepreneurial skills and knowledge through meaningful hands on experience

3. Organizational set up of the EL Unit:

To give the real experience of an Enterprise to the student, each EL unit maintains an organizational set up as follows:



The above organigram depicts the hierarchy of the enterprise. Advisors from the private sectors can also be engaged for consultation for the programme, production and sales profitability. The Head of the department where EL unit is proposed should identify suitable faculty member with commitment as Manager of the EL programme. Another faculty member should also be identified to assist the manager during the period of absence due to unavoidable circumstances.

4. Registration and Orientation

The students will register for 20 credits (0+20) in a semester. The duration/weightage for different activities during the year will be as under:

Activity	Credit hours	Durations
Orientation	-	2 weeks
Experiential Learning	0+20	26 weeks
Rural Agricultural Work Experience (RAWE)	0+10	6 weeks
Industrial training or Inplant Training	0+10	18 weeks

i) Orientation:

The students will be introduced to the concept of above programme and its components to be achieved through experiential learning.

ii) Experiential Learning:

Under this programme, the students will undergo hands on training based on the concept of “earn while you learn” adopting an end to end approach (production to marketing).

The students will choose one programme out of the following three programmes (Modules):

1. Commercial Horticulture
2. Protected cultivation of high value Horticultural crops
3. Processing of fruits and vegetables for value addition.

iii) Rural Agricultural Work Experience (RAWE):

Under RAWE, students will be required to stay in the villages along with the farmers to have a deeper insight in to the rural life and will study the village profile i.e. Literacy, nutritional habits, socio-economic status, status and potential of Horticulture, Technological gaps, various developmental schemes run by the government and NGOs working in that area etc. The students will maintain the daily work sheet to be evaluated weekly by evaluation committee in consultation with the local bodies.

iv) Industrial Attachment/inplant training:

The students will be attached with the related industry (ies) where they will work under the real life situations. This will give them opportunity to critically examine the weaknesses and gaps in their chosen programmes. The progress of the students will be monitored and evaluated jointly by the representatives of the concerned industry and the committee constituted for this purpose by the University in the weightage of 75:25.

Note: The plan and sequence of the Experiential Learning Programme, RAWE and industrial attachment will be finalized by the various Colleges/Institutions as per the production plan/ agro-climatic conditions prevailing in their regions.

v) Coordination/Monitoring/Evaluation Committee:

For this programme, a senior level Professor (Managing Director) will be nominated as a Coordinator along with two experts/specialists (Managers) from each of the experiential learning modules to execute the programme. They will monitor and evaluate the activity and progress of the students.

5. Attendance

The minimum attendance required for this programme is 85%. The attendance of a student will be maintained at the EL unit. The attendance particulars shall be communicated to the Chief Executive Officer (Associate Dean) by the Manager of the EL unit every week. The students will be eligible for the final evaluation of EL only when the attendance requirement is met with. Any student in the event of recording shortage of attendance, has to re-register the EL when offered next by paying the assigned fee.

6. Eligibility

The students will not be allowed to club any creditable course along with ELP. However, they will be allowed to clear the back log after the completion of ELP.

7. Discipline

Students are expected to adhere to the activities of the enterprise strictly during the programme duration. If the activities are prejudicial to the EL programme, the student shall be withdrawn from the programme and subjected to disciplinary action as per the University norms.

8. Student Advisory Committee

An Advisory committee will be constituted for EL programme with the EL Manager of the unit and the general advisor allotted to the student at the time of admission. The student shall meet the advisor once in a week and review the progress of ELP.

Manager:

- Orientation of the EL activities of their discipline to the students
- Record the attendance of the students and ensure the participation of the student for 8 hours per day
- Identify the resource persons in the relevant field and arrange for guest lectures
- Identify and arrange for student's training in entrepreneurial advanced skills after approval from CEO
- Group the students as per their skill and interest in carrying out the enterprise activities
- Assist students in developing business plan/ project proposals
- Offer suggestions in all EL activities
- Plan for survey and accompany students for receiving effective market information
- Conduct the primary assessment of the business plan and give report to the MD
- Steer the students in construction of production plan
- Guide the students in production
- Guide the students for quality analysis
- Lead the students for marketing and sale of products
- Monitor all enterprise activities daily for 8 hours
- Fix the responsibility of enterprise activities to the students & rotate the responsibilities
- Guide the students for record keeping and enterprise economics
- Inform MD and CEO about the progress of EL unit
- Propose the examination schedule

9. Devolution of powers:

CEO:

- Overall responsibility for successful functioning of all EL units under the college
- Recommend / withdraw the EL unit based on the profit / loss status of the unit in coordination with EL MD and Manager
- Sanction power upto Rs 1,00,000/

MD:

- Responsible for over all progress of the El unit
- Recommend to the CEO for closure of the unit if the status of the El unit is not satisfactory in terms of profit and quality of the end product
- Sanction power up to Rs 50,100/-

Manager:

- Responsible for day to day activities of the EL unit
- Report to the MD about the functioning of the El unit
- Sanction power up to Rs 25,000/

Above Rs 1,00,000 permission required from Dean of faculty

10. Programme of Work:

The EL programme will continue for 180 days without any break. The schedule of the work is as follows:

S.No.	EL Activity	No. of Days
1.	Orientation/ project development	02 weeks
2.	Production and marketing	22 weeks
3.	Documentation and report writing	01 week
4.	Evaluation/Oral Examination	01 week
5.	Total	26 weeks (restricted to 180 days)

11. Programme Monitoring:

The programme will be continuously monitored by the Manager and MD (Head of the Department). The CEO (Associate Dean) will receive the information about the EL unit regularly and monitor physically once in a week. The sales part of all the units in the college will also be continuously monitored by the CEO. The sales of all EL products will be arranged in the most prominent place in the college to attract the customers. The Dean will monitor the EL programme once in a month and offer suggestions.

12. Faculty responsibilities:

CEO (Dean/Associate Dean):

- Arrange for registration and general orientation of the EL programme
- Motivate students for effective participation
- Approve the arrangements made for training students in advanced skills
- Assess the feasibility of the business plans developed in all units in coordination with experts in the field
- Monitor the enterprise activities of each unit on weekly basis Render help in solving administrative problems of the unit
- Convene regular meetings with MDs of all EL units and advisors of the students In the college to ensure the profitability of the EL unit
- Approve the schedule of the examination

MD

- Orientation of the EL activities of their discipline to the students
- Identify resource persons in the relevant field along with the Manager
- Scrutiny of business plan/ project proposals and submission to CEO
- Offer suggestions in all EL activities
- Monitor EL programme of their unit twice a week
- Issue letters of correspondence for interaction with other enterprises/ institutes
- Conduct of examination and evaluation
- Scrutiny of EL unit records

MODULE 1

(COMMERCIAL HORTICULTURE)

Module -1: Commercial Horticulture

Sr.No.	Activity	Credit hours
a.	Nursery production of fruit crops	(0+7)
b.	Nursery production of ornamentals	(0+7)
c.	Protected cultivation of vegetables and flowers	(0+6)

1. Objectives

- To develop skill in producing quality planting material of fruit crops
- To acquire skill in nursery production of commercially important ornamentals
- Multiplication of ornamental plants to cater the need of landscape industry
- To acquire skills in various activities of the protected cultivation of high value vegetables and flowers
- To develop enterprise management capability

2. Justification:

Horticulture has become a key driver for economic development in many states of the country but one of the constraints is availability of planting material, poor yields and low productivity, wider year to year fluctuations and poor quality of produce. The use of low grade and poor quality planting materials is one of the major causes for low productivity. This warrants proper planning to increase production and productivity for which trained skilled human resources in horticulture are the need of the hour. Through experiential learning on commercial horticulture, the students will produce quality planting material of fruits, ornamentals and vegetable crops. Besides this, they will also develop the managerial skills of entrepreneurship.

3. Activity components :

- a. Survey and risk assessment
- b. Sourcing for inputs
- c. Saleable plant materials
- d. Production plan
- e. Production and quality control
- f. Packaging & marketing
- g. Financial accounting
- h. Profits

4. Project development

- a) Demand assessment
 - To be obtained from the concerned state Horticulture/ Agriculture departments, marketing need assessment.
- b) Sourcing of inputs
 - All the inputs like rootstocks, seeds, fertilizers, pesticides, planting materials, trays, pots/containers, media, growth regulators and garden tools etc.
- c) Type of products
 - Potted and bag plants, grafted, budded and own rooted fruit plants, vegetable and flower seedlings, vegetables and flowers produce.
- d) Production plan
 - Decision on season, quantity to be produced, varieties to be grown, market channels
- e) Orientation about funding agencies
 - NABARD and other banks

- f) Production *per se*
 - Preparation of activity chart/ Bar chart for production schedule
- g) Packaging and marketing
- h) Financial accounting (Calculation of net profit on the end- to-end basis)

5. Distribution of credits activity wise

S.No.	Activity	Components	Credit Hrs
1.	Nursery Production of fruit crops	<ul style="list-style-type: none"> • Raising of rootstocks • Grafting & Budding of rootstock • Management of grafted plants • Plant certification, packaging & marketing, quality control 	07
2.	Nursery production of ornamentals	<ul style="list-style-type: none"> • Production of plantlets • Production of potted plants • Management & Maintenance • Sale & marketing 	07
3.	Protected cultivation of vegetables and flowers	<ul style="list-style-type: none"> • Nursery raising/procurement & transplanting • Management & maintenance of the crop • Postharvest handling, quality control & marketing 	06

6. Duration

- | | | |
|-------------------------------------|---|----------|
| 1. Orientation/ project development | - | 02 weeks |
| 2. Production and marketing | - | 20 weeks |
| 3. Documentation and report writing | - | 01 week |
| 4. Evaluation/Oral Examination | - | 01 week |

Total

7. Faculty responsibilities :

- Orientation – introduction, objectives
- Procurement of inputs
- Monitoring, assessment and evaluation
- Arranging for guest faculty
- Supervision of production, marketing

8. Production Plan – An illustrative example for hill horticulture (Others colleges may develop their own plan suited to their regional situations).

Duration	1 st week	2 nd week	3 rd week	4 th week
1st Month	<p>Orientation</p> <ul style="list-style-type: none"> • Fruit & ornamental nursery • Protected cultivation • Market survey & project development <p>Ornamental nursery</p> <ul style="list-style-type: none"> • Creation of facilities viz., shade net house, portable tunnels & low cost poly house. • Procurement of growing media, container/nursery bags, pots and planting material, tools and implements etc. 	<ul style="list-style-type: none"> • Preparation of the project on the identified activities <p>→ → →</p> <p>Ornamental nursery</p> <ul style="list-style-type: none"> • Preparation of beds and sterilization of growing media/nursery beds. • Creation of irrigation facilities etc. <p>Protected cultivation</p> <ul style="list-style-type: none"> • Creation of the requisite infrastructure • Procurement of necessary inputs 	<p>Fruit nursery</p> <p>Hoeing and weeding of the nursery area</p> <p>Ornamental nursery</p> <p>→ → →</p> <p>→ → →</p> <p>Protected cultivation</p> <p>→ → →</p> <p>→ → →</p> <ul style="list-style-type: none"> • Treatment of growing media 	<p>Fruit nursery</p> <p>Budding and summer grafting in apple and kiwifruit</p> <p>Ornamental nursery</p> <ul style="list-style-type: none"> • Filling up of portrays/nursery bags, containers etc. with the sterilized growing media. • Treatment of seeds/cuttings propagules and planting thereof. • Irrigation of the nursery bags/protrays/containers and nursery beds etc <p>Protected cultivation</p> <ul style="list-style-type: none"> • Raising/procurement of healthy nursery plants and planting
2nd Month	<p>Fruit nursery</p> <ul style="list-style-type: none"> • Hoeing and weeding • Plant protection measures • Collection of seeds • Budding in kiwifruit <p>Ornamental nursery</p> <ul style="list-style-type: none"> • Intercultural operations like weeding, hoeing, watering etc. including plant protection measures. • Sowing/planting of propagules. 	<p>Fruit nursery</p> <p>→ → →</p> <p>→ → →</p> <p>→ → →</p> <p>→ → →</p> <p>Ornamental nursery</p> <p>→ → →</p>	<p>Ornamental nursery</p> <ul style="list-style-type: none"> • Intercultural operations like weeding, hoeing, watering etc. including plant protection measures. • Sowing/planting of propagules Filling up of pots/containers. • Filling of nursery bags. /pro trays/ containers etc, with the sterilized growing/ rooting 	<p>Ornamental nursery</p> <p>→ → →</p> <p>→ → →</p> <p>→ → →</p>

	<ul style="list-style-type: none"> • Filling up of pots/containers. <p>Protected cultivation Raising/procurement of healthy nursery plants and planting, gap filling, fertigation Hoing, weeding watering etc. & plant protection</p>	→ → →	<p>media.</p> <ul style="list-style-type: none"> • Sterilization of nursery beds. • Procurement /preparation of plant propagules. <p>Protected cultivation</p>	<ul style="list-style-type: none"> • Packing, sale/marketing of nursery plants. <p>Protected cultivation</p>
3rd Month	<p>Fruit nursery</p> <ul style="list-style-type: none"> • Weeding and hoeing • Plant protection measures <p>Ornamental nursery</p> <ul style="list-style-type: none"> • Intercultural operation like weeding, hoeing, watering etc. including plant protection measures. • Sowing/planting of propagules Filling up of pots/containers. • Packing, sale/ marketing of nursery plants <p>Protected cultivation Hoing, weeding, watering , plant protection & fertigation</p>	→ → → → → → → → → → → → → → → → → →	<p>Fruit nursery</p> <p>Ornamental nursery</p> <p>Protected cultivation</p>	<p>Fruit nursery</p> <p>Ornamental nursery</p> <p>Protected cultivation</p>
4th Month	<p>Fruit nursery</p> <ul style="list-style-type: none"> • Weeding and hoeing • Plant protection measures • Procurement of kiwifruit seeds <p>Ornamental nursery</p> <ul style="list-style-type: none"> • Intercultural operations like weeding, hoeing, watering etc. including plant protection measures. 	→ → → → → → → → →	<p>Fruit nursery</p> <p>Ornamental nursery</p>	<p>Fruit nursery</p> <p>Ornamental nursery</p>

	<ul style="list-style-type: none"> • Sowing/planting of propagules Filling up of pots/containers. • Packing, sale/ marketing of nursery plants. <p>Protected cultivation Intercultural operations like weeding, hoeing, watering etc. including plant protection measures.</p> <p>Pinching, staking, disbudding, fertigation and</p>	→ → →	→ → →	→ → →	→ → →
		Protected cultivation	Protected cultivation	Protected cultivation	Protected cultivation Harvesting, grading, packaging & marketing of vegetable produce
		→ → →	→ → →	→ → →	
		Pinching, staking, disbudding, fertigation & harvesting, grading, packaging & marketing of vegetable produce	→ → →		
5th Month	<p>Fruit nursery</p> <ul style="list-style-type: none"> • Uprooting of nursery plants • Inspection, grading, labeling and treatment of nursery plants • Stratification of seed <p>Ornamental nursery</p> <ul style="list-style-type: none"> • Intercultural operations like weeding, hoeing, pinching, disbudding, de-shooting, watering etc. including plant protection measures. • Sowing/planting of propagules Filling up of pots/containers. • Packing, sale/ marketing of nursery plants. <p>Protected cultivation Harvesting, grading, packaging & marketing of vegetable produce</p>	<p>Fruit nursery</p> <p>→ → →</p> <p>Ornamental nursery</p> <p>→ → →</p> <p>Protected cultivation</p> <p>→ → →</p>	<p>Fruit nursery</p> <p>→ → →</p> <p>Ornamental nursery</p> <p>→ → →</p> <p>Protected cultivation</p> <p>→ → →</p>	<p>Fruit nursery</p> <p>→ → →</p> <p>Ornamental nursery</p> <p>→ → →</p> <p>Protected cultivation</p> <p>→ → →</p>	

	Intercultural operations like weeding, hoeing, pinching, disbudding, de-shooting, watering etc. including plant protection measures.	→ → →	→ → →	→ → →
6th Month	<p>Fruit nursery</p> <ul style="list-style-type: none"> • Packaging and sale of nursery plants • Maintenance of nursery record • Stratification of seeds • Preparation of seed beds & Seed sowing • Transplanting of rootstocks <p>Ornamental nursery</p> <ul style="list-style-type: none"> • Intercultural operations like weeding, hoeing, watering etc. including plant protection measures. • Sowing/planting of propagules Filling up of pots/containers. • Packing, sale/ marketing of nursery plants. <p>Protected cultivation</p> <ul style="list-style-type: none"> Harvesting, grading, packaging & marketing of produce Intercultural operations like weeding, hoeing, pinching, 	<p>Fruit nursery</p> <ul style="list-style-type: none"> • Maintenance of nursery record • Working of the profits → → → • Collection & storage of scion wood → → → • Grafting & budding <p>Ornamental nursery</p> <ul style="list-style-type: none"> → → → → → → → → → <p>Protected cultivation</p> <ul style="list-style-type: none"> → → → → → → 	<p>Fruit nursery</p> <ul style="list-style-type: none"> • Preparation of nursery land and beds • Application of manures & fertilizers → → → → → → • Irrigation, Weeding & Mulching of nursery <p>Ornamental nursery</p> <ul style="list-style-type: none"> → → → → → → → → → <p>Protected cultivation</p> <ul style="list-style-type: none"> → → → → → → 	<p>Fruit nursery</p> <ul style="list-style-type: none"> → → → → → → → → → → → → → → → • Nursery record <p>Ornamental nursery</p> <ul style="list-style-type: none"> → → → → → → → → → <p>Protected cultivation</p> <ul style="list-style-type: none"> → → → → → →

	disbudding, de-shooting, water/fertigation etc. including plant protection measures.			
			Documentation and report writing	Examination

Note- Accounts shall be maintained regularly.

9. Infrastructure

A. Civil Work

S.No.	Activity	Civil work	Amount (Rs)
1.	Nursery Production of fruit crops	Shade net house (500 m ² area) Refrigerator for scion wood storage	3,00,000 50,000 =3,50,000
2.	Nursery production of ornamentals	<ul style="list-style-type: none"> • Shade net house (500² area) • Potable tunnels (15 Nos covering an area of around 150m²) • Low cost poly house fitted with anti-insect net and foggers (300m²) 	3,000,00 1,50,000 2,000,00 =6,50,000,
3.	Protected cultivation of vegetable and flowers a) Cultivation of commercial flowers b) Production of high value vegetable crops	<ul style="list-style-type: none"> • Establishment of 3 cost effective poly houses • Cold storage facility (1000cu.ft) • Grading and Packaging hall 	7,50,000 5,00,000 2,00,000 =14,50,000
	TOTAL		24,50,000

Note: Facilities not available only be demanded

B. List of tools/equipments:

S.No.	Activity	Item	Amount (Rs.)
1.	Nursery Production of fruit crops	Grafting & budding Knives, Secateurs, spray pumps etc.	50,000
2.	Nursery production of ornamentals	Budding Knives, Secateurs, spray pumps, wheel barrows etc.	50,000
3.	Protected cultivation of vegetable and flowers a) Cultivation of commercial flowers b) Production of high value vegetable crops	Secateurs, spray pumps etc.	20,000
	TOTAL		1,20,000

10. Recurring contingencies
Revolving Fund - Rs. 10.00 lakh

S.No.	Activity	Item	Amount (Rs.)
1.	Nursery Production of fruit crops	a) Manures, fertilizers, pesticides, etc. b) Cost of seedling rootstock c) Grafting charges d) Packaging e) Contractual labour (600 man days)	50,000 2,40,000 30,000 15,000 1,50,000 =4,35,000
2.	Nursery production of ornamentals	a) Cost of portrays/ containers /nursery bags/ pots and manures, etc. b) Cost of seed/mother stock c) Growing Media & PGR's chemicals /pesticides. d) Contractual labour (500 man days @ Rs 130 /- each) e) Irrigation pipes/ water tanks etc f) Packing/packaging/transportations and marketing charges	1,20,000 50,000 25,000 65,000 35,000 20,000 =3,45,000
3.	Protected cultivation of vegetable and flowers a) Cultivation of commercial flowers b) Production of commercial vegetable crops	a) Manures, fertilizers, pesticides, etc. b) Cost of planting materials : Flowers Vegetables c) Packaging & handling etc. d) Contractual labour (600 man days)	25,000 40,000* 10,000 25,000 80,000 =1,80,000

* Calculated on 6 month basis

11. Production

S.No.	Activity	Material produced
1.	Nursery Production of fruit crops	60,000 nursery plants of fruit crops in 1500 m ² area (eg. Apple & kiwi etc.)
2.	Nursery production of ornamentals	Total area required = 4000 m ² a. Seedlings of annuals= 2,10,000 b. Indoor plants in bags =25,000 c. Potted plants = 3,000 d. Outdoor plants = 24,000
3.	Protected cultivation of vegetable and flowers a) Cultivation of commercial flowers (eg. carnation)	80,000 cut flowers / 500 m ² area

b) Production of high value vegetable crops (eg.capsicum fruits)	40 quintals of capsicum fruits (Feb-July)+50 q of Tomato (Aug-Jan) from 500 m ² .area
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Note:

- i) Production plan for 10 students
- ii) Crop (fruit/vegetable/ornamental/flowers) to be selected should be commercially viable & region specific
- iii) Varieties recommended by the university may be considered
- iv) Facilities already available in the colleges should be utilized

S.No.	Activity	Quantity	Gross income (Rs)	Production cost	Net profit
1.	Nursery Production of fruit crops(10% mortality)	54,000 (@ Rs 30)	16,20,000	4,85,000	11,35,000 (from 1500 m ² area)
2.	Nursery production of ornamentals Seedlings Bag plants Potted plants Outdoor plants	2,10,000 (@ Rs 0.50/- 25,000 (@ Rs 20/- 3,000 (@ Rs 100/- 24,000 (@ Rs 10/-	1,05,000 5,00,000 3,00,000 2,40,000 11,45,000	3,95,000	Rs 7,50,000 from an area of 4000m ²
3.	Protected cultivation of vegetable and flowers a) Cultivation of commercial flowers(carnation) b) Production of high value vegetable crops i. Capsicum (Jan-July) ii. Tomato /cucumber(Aug-Dec.)	80,000 cut stems* (@Rs 3/stem) 40 quintals (@Rs 30/kg) 50 quintals@Rs 20/Kg	2,40,000 1,20,000 1,00,000 4,60,000	2,00,000	Rs.2,60,000 from 1500m ² in one year
	Net Profit				21,45,000
	Net Profit per student per month				26,813(75%share)

**The production during the period of 6 months has been computed. The production cost included only recurring contingencies plus minor tools/equipments*

12. Marketing strategy/Plan including product sale

Marketing:

- Develop the market strategy (packaging, transportation and sale)
- Liaisoning with the state agriculture/horticulture departments/ farmers/ landscape developers, hotel industry etc.

13. Risk assessment:

- Market gluts, weather vagaries, natural calamities
- Fluctuation in demand

14. Economics

S.No.	Activity	Gross income (Rs)	Expenditure (Rs)	Net profit (Rs)	Per student per month profit (@ 75%)	Profit share of the department per month(@ 25%)
1.	Nursery Production of fruit crops	16,20,000	4,85,000	11,35,000 (from 1500 m ² area)	14,188	47,292
2.	Nursery production of ornamentals	11,45,000	3,95,000	7,50,000	9,375	31,250
3.	Protected cultivation of vegetable and flowers	4,60,000	2,00,000	2,60,000	3,250	10,833
	Total	32,25,000	10,80,000	21,45,000	26,813	89,375

Note: Net profit worked out for 10 students and profit share per month is worked out on the basis of net income from 6 months.

MODULE-2

(PROTECTED CULTIVATION OF HIGH VALUE HORTICULTURE CROPS)

Module-2: Protected cultivation of high value horticulture crops.

1. Location with address: College of Horticulture/Departments.

2. Objectives

- To develop skill in protected cultivation of high value horticulture crops like production of healthy planting material, cultivation of flowers and quality vegetable production
- Understanding various greenhouse structures, their construction and design as per the agro climate of the area.
- To acquire enterprise management capability.
- To develop skill about crop production methods of these specified crops.

3. Justification of skill learning and employability

The protected cultivation is a common practice in advanced countries to produce vegetable and other horticultural crops with more productivity and higher levels of quality that fetches high returns to the growers. It also provides an opportunity for efficient resource management of various inputs required in crop production hence making it more profitable. Even areas which are unfit for conventional cultivation can be brought into cultivation because of the use of artificial growing conditions and media.

The students will also have the opportunity to understand the construction of the greenhouses on scientific lines and further raising of the different crops with right selection of varieties and their management. After developing the skills the student will have ample experience to start their own entrepreneurship in this area.

4. Activity components

The modules will be dealt under the following three sub-modules.

- i. Raising quality planting material on commercial scale.
- j. Cultivation of commercial flowers.
- k. Production of high value vegetables/fruits.

The major activity components will be as follows:

- a. Assessment of market demand for crop selection.
- b. Procurement of quality planting material and other inputs.
- c. Types of products to be procured
- d. Design selection and construction of greenhouse (Pre-activity)
- e. Development of production plans
- f. Packaging and marketing
- g. Financial Accounting

5. Project development

- j) Demand assessment
The crops will be selected for growing inside the greenhouses as per their demand in the major whole sale and retail markets in the nearby region. The opportunities of the buyback arrangement will also be explored.
- k) Procurement of inputs
All inputs required in crop production like seeds, fertilizers and growing media etc will be procured from the open market.
- l) Types of inputs to be procured activity-wise
- Raising of quality planting material (Growing media, protrays, growth regulators, seeds etc)
 - Production of flowers (Planting material, other inputs).
 - Production of vegetables/fruits (Seeds, seedlings and other inputs)
- m) Development of production plans: Preparation of bar charts for production schedule.
- n) Packaging and marketing.
- o) Financial accounting (calculation of net profit on end to end basis)

6. Distribution of credits activity wise

The 20 credits of the module will be distributed in the following manner for each activity.

• Raising quality planting material on commercial scale.	6 Credits
• Cultivation of commercial flowers and foliage plants.	7 Credits
• Production of high value vegetables/fruits.	7 Credits
Total	20 Credits

7. Duration

• Orientation and project development	-2 weeks
• Production and marketing	-20 weeks
• project report writing and presentation	-1 weeks
• Oral examination and evaluation	-1 week
Total	24 weeks

8. Faculty responsibilities :

- Orientation – introduction, objectives and related counseling.
- Procurement of inputs
- Providing necessary tips for cultivation and crop selection
- Mentoring , assessment and evaluation

- Supervision of project proposal
- Arranging for guest faculty
- Supervision of production, marketing

9. Production Plan

Number of greenhouses : 3 Cost –effective (500m²) (3.0 Lac/GH)
 : 1 Fan and Pad cooled (500m²) (5.0 lacs/GH)

S.No	Activity	Material generated (Time frame 5 months)
1.	Raising quality planting material on commercial scale (based on demand)	-2 lacs cuttings of carnation in 500 m ² greenhouse in six months -2 lakh seedlings of capsicum/ Tomato in protrays and a commercial crop of Cucumber in 500 m ² greenhouse (The crop and time for planting material need to be selected as per the demand in the region). + -Cucumber crop from Aug to December (50q)+ - A tomato crop from Feb. to July (40q).
2.	Cultivation of commercial flowers.	-40,000 cut flowers from 500m ² greenhouse
3.	Production of high value vegetables/fruits	- 40 quintals of capsicum fruits (Feb.-July) - + 50 q of Tomato (Aug-Jan.) from 500m ² GH

Note: Examples are illustrative only. Crops may be chosen based on the feasibility in the area.

10. Infrastructure (i) Civil, (ii) equipment/machinery, (iii) any other

(i) Civil work

Civil work	Establishment of fan and pad system greenhouse (based upon demand)	Rs.5.0 lakh
	3 Cost-effective greenhouses	Rs.9.0 lakh
	Mist Chamber (80sqm)	Rs.8.0 lakh
	Total	Rs. 22.0 lakhs

(ii) List of equipment/ machinery required

Machinery type	No	Amount (Rs in Lakhs)
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Power tiller (one in all ELU,s)	1	1.5
Need based equipments like climate and soil monitoring system		3.0
Total		4.5

(iii) Other infrastructure facilities required with cost

S.No	Item	Number	Amount (Rs. in lakhs)
1	Cold storage facility (1000 cubic feet)	1 No.	5.00
2	Grading and packaging hall	1 No.	2.00
Total			7.00

11. Recurring Contingency required (for various inputs)

Rs 3 lakhs

12. Total Budget required

Civil works

Rs. 22.0 Lakhs

Equipments

Rs 4.5 lakhs

Other Infrastructure required

Rs 7.0 lakhs

Revolving fund (Recurring contingencies)

Rs 4.0 lakhs

Total

Rs 37.5 lakhs

13. Production (Activity-wise)

A. Production and Economics :

The production during the period of 6 months period will be as follows

S.No	Activity		Production Cost	Quantity	Total Returns	Total Profit
1.	Raising quality planting	Floriculture (Carnation)	Rs 2,60,000 (year round)	4 lakh cuttings	24.0 L	21.40 L

	material on commercial scale.	Vegetable seedlings	Rs 1,00,000 /500 m ²	2 lakh seedlings	2.0 L	1.0L
		Cucumber production (Aug-Dec)	Rs. 30,000.0	50.0 q (20/ kg)	1.0 L	0.7L
		Tomato Crop (Jan-July)	Rs. 20,000.0	40.0q (20/kg)	0.80 L	0.6L
2.	Cultivation of commercial flowers.		Rs 80,000.0 per year	80,000 cut flowers	2.4L	1.6 L
3.	Production of high value vegetables/fruits Capsicum (Jan-July)		Rs 30,000.0	40q (30/ kg)	1.2L	0.9L
	Tomato/Cucumber (Aug-Dec)		Rs. 25,000.0	50q (20/kg)	1.0L	0.75L
	Total		Rs. 5,45,000.0		32.40L	26.95L

Total Cost	5.45 L
Labour Cost (10% of total cost)	54,500.0
Net Profit	26.95-54,500= 26, 40,500.0
Faculty & Department share (25%)	6, 60,125.0
Student Share (75%)	19, 80,375.0
Per month student profit	8200.0 (Approx.)

14. Marketing strategy/Plan including product sale

Marketing:

- Supply to specialized markets
- Supply to wholesale markets, local markets and farm gates etc.
- Sales point at college /university premises in an outlet

15. Risk assessment:

- Unforeseen fluctuation in market demand
- Perishability of produce
- Phyto-sanitary conditions
- Productivity variations
- Quality of seeds and produce etc.

MODULE-3

(Processing of fruits and vegetables for value addition)

Module-3 : Processing of fruits and vegetables for value addition

1. **Location with address:** College of Horticulture/Department.

2. **Objectives:**

- To provide interactive learning experience in value addition of horticultural produce at commercial level
- To impart professional skills in operating and maintenance of equipments in processing plant
- To impart skills in quality control assurance of processed products
- To develop professional skills amongst the students in dealing with customers/marketing
- To develop professional skills in finance and market management
- To help in developing managerial skills amongst the students

3. **Justification of skill learning and employability:**

India is the second largest producer of fruits and vegetables in the world. At the same time, there are huge post harvest losses in the fruit & vegetable industry, that are estimated to range between 25-30%. Several causes contributing to these losses mainly include lack of infrastructure and poor knowledge of value addition. Presently, less than 2% of the total horticulture produce is processed in spite of increased demand in the market for different processed products. The products proposed in this programme have a wide consumer demand and are being sold commercially at high prices. Therefore, this unit can help in reducing postharvest losses, improve utilization of fruits & vegetables in glut season and provide quality items at reasonable cost. The students will gain firsthand knowledge in the manufacturing process, will acquire skill and have the opportunity for employment in self-employment ventures, food industries, academic institutions etc. The skills to be learnt will include:

- Planning and execution of a market survey, preparation of processing schedule
- Preparation of project module based on market information
- Calculation of capital costs, sources of finance, assessment of working capital requirements and other financial aspects
- Identification of sources for procurement of raw material.
- Production and quality analysis of fruits and vegetables products at commercial scale
- Packaging, labelling, pricing and marketing of product

4. **A. Activity components :**

- Market survey
- Sourcing for raw materials
- Details of products to be prepared
- Product specifications and licensing
- Establishment of processing plant

- Production plan
- Production on the factory floor
- Packaging
- Quality assurance
- Cost and benefit analysis
- Marketing
- Risk assessment
- Profit

B. Activity components :

S.No	Activity	Components	Sub components
1.	Orientation	All aspects of EL	<ul style="list-style-type: none"> ➤ Development of project proposal ➤ Quality parameters of the products ➤ Link organizations like banks etc ➤ Packaging, labelling and marketing ➤ Calculation of cost-benefit ratio ➤ Accounting and record keeping ➤ Report writing
2.	Project development	Market survey	<ul style="list-style-type: none"> ➤ Availability of raw material ➤ Product availability in the market ➤ Outlet survey ➤ Quantity required with pricing
		Project preparation and presentation	<ul style="list-style-type: none"> ➤ Raw material and equipments required ➤ Packaging and labelling material required ➤ Stationery and record books ➤ Sale points and link organizations to be involved ➤ Production plan ➤ Quality assurance ➤ Finances required ➤ Marketing strategy ➤ Cost-benefit ratio
3.	Production	Preparation of products for sale	<ul style="list-style-type: none"> ➤ Batch-wise production ➤ Quality evaluation ➤ Packaging, labeling and pricing ➤ Maintenance of records
4.	Sales	Transportation of products to different sales points	<ul style="list-style-type: none"> ➤ Sale point at college / university / parks etc ➤ Local state co-operative societies ➤ Hostels / hospitals / health and fitness centers / schools etc. ➤ Shopping malls ➤ Documentation of sales details ➤ Calculation of cost-benefit ratio
5.	Preparation of final report	All aspects of EL	

	writing	
6.	Examination	<ul style="list-style-type: none"> ➤ Presentation of the report ➤ Viva-voce examination

5. Project development:

- p) Survey
 - Survey will be carried out for the availability of raw material as well as demand of the products in the market.
- q) Types of products
 - Products will be selected based on consumer demand.
- r) Product specifications
 - Products would be prepared according to specifications given by FSSAI.
- s) Establishment of processing plant and licensing
 - Processing plant will be established as per the guidelines of FSSAI
 - License will be procured from FSSAI for the establishment of processing plant
 - Quality control laboratory will be established
 - Provision for waste disposal will be made
- t) Orientation about funding agencies – NABARD, NHB, MoFPI, etc.
 - Feasibility of submitting proper project proposal in establishing the enterprise to these agencies would be explored. Facilities provided under different agencies will help the students to understand the source of funds.
- u) Product development:
 - It will include:
 - Procurement of raw material, transportation and storage
 - Conversion of raw material into semi and finished products
 - Quality of the products will be ensured according to the FSSAI legal standards
 - Calculation and costing of raw material, manpower, accessories, packing etc of the products

6. Production plan: (Illustrative Example)

A. Raw material availability chart:

Fruits/ Vegetables	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Apple												
Plum												
Apricot												
Mango												
Kiwi												
Citrus (galgal)												
Pear												

Strawberry												
Tomato												
Vegetables (winter)												

B. Product production chart

Products	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Apple juice												
RTS beverages												
Fruit squashes												
Fruit jams												
Pickles												

Note: The period of production of the products may vary depending upon the market demand and availability of raw material at reasonable prices

C. Approximate cost of production and profit (for six months)

Sr. No.	Name of the product	Total cost of production (Rs./kg)	Manufacturer Sale price (Rs./kg)	Net profit (Rs./kg)	No. of days for production	Production per day (kg)	Total production during the prog. (kg)	Total turnover/receipt (Rs)	Profit during the prog. (Rs.)
1	2	3	4	5= 4-3	6	7	8= 6X7	9= 8X4	10
Major products									
1	Apple juice	28	55	27	20	500	10,000	5,50,000	2,70,000
2	RTS beverages	20	50	30	40	800	32,000	16,00,000	9,60,000
3	Fruit squashes	30	55	25	40	500	20,000	11,00,000	5,00,000
Minor products									
4	Fruit jam	70	90	20	25	250	6,250	5,62,500	1,25,000
5	Pickles	40	50	10	20	250	5,000	2,50,000	50,000
Total					145			40,62,500	19,05,000
Share of 15 students' @ 75% of Rs.19,05,000 =				Rs. 14,28,750					
Share of each student for six months =				Rs. 95,250					
Share of each student per month =				Rs. 15,875					

Note: Selection of products would depend upon market demand and regional needs

- Fruit/vegetable recovery (Approx) = 50-60%
- Cost of raw material (Approx) = Rs.10-15/- per kg
- Production cost includes processing, packaging and transportation charges
- Quality check for raw material = Physico-chemical characteristics like TSS, acidity, pH, sugar, salt etc. wherever applicable.

7. **Production activities:** Same as above

8. **Marketing strategy/Plan including product sale:**

Marketing:

- Sales point at college /university premises in an outlet
- Local state co-operative societies
- Hostels /Health and fitness centers/schools/NGOs
- Weekend markets in street markets
- Shopping malls

9. **Risk assessment:**

Risk identified	Action proposed
Hike in prices of raw material	Appropriate measure would be taken to stabilize the production cost
Non availability of power, water etc	Re-scheduling of preparation time during day
Extreme climate change like heavy rains	Redefine our production targets
Equipment breakdown	Attending to immediate repair
Non availability of raw material/packaging material	Find alternate sources or substitute with available material
Storage losses with perishables	Plan for pest control, storage containers, cold room etc
Non-availability of transport	Hire a vehicle due to non-availability of official vehicle

10. **Infrastructure required with cost for fruit & vegetable processing plant:**

(A). **Processing Plant Building and ETP**

Sino	Item required	Approximate Cost (Rs)
1.	Processing hall comprising of processing area, raw and packaging material stores, finished product store, office, Quality control lab, boiler room, waste water drainage and treatment system, lighting system, 3 phase power connection, etc.	40.00 lakhs

(B). **Machinery and equipments**

Plant machinery and equipments	Cost (Rs. In lakhs)
Boiler with accessories, cold store, juice/ beverage/ bottling line, pulper, double jacketed kettle, juice extractor, SS top tables, SS mixing and storage tanks	90.00

with agitators, SS lines with/without on line filters and two and three way valves, sorting belt conveyor, washing tub with re-circulation pump, hydraulic press, fruit grater, PP cap sealer, lug cap sealer, shrink wrap machine, platform type balance, hydraulic pallet truck, storage drums/carboys, water storage tanks (plastic) plastic crates, ETP machinery , mechanical dehydrator, electrical motors, control cables and cables trays, steel structure, stairs, walkways etc, quality control laboratory instruments etc.	
Total cost of establishment (A + B)	130.00

11. Recurring contingency required:

- Fruits & vegetables
- Spices & condiments
- Salt, sugar and other additives
- Packaging and labelling material
- Laboratory chemicals
- Stationery and record books
- Machine servicing and AMC
- Honorarium for guest faculty
- Expenses for faculty training
- Transport
- Miscellaneous

Total budget required = Rs. 130 lakhs

Total Revolving Fund required = Rs. 10.00 lakhs
(recurring contingency)