

# **FRUITS AND VEGETABLES**

**SECOND YEAR**

**VOCATIONAL HIGHER SECONDARY**

**TEACHERS' SOURCEBOOK**



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# Preface

**Dear Teachers,**

**T**his Teacher's Sourcebook on **Agriculture (Fruits and Vegetables)** introduces the teacher to the main principles and practices of the revised pedagogy which is activity-based, process-oriented and learner-centred.

The realisation that learning is not mere storing information in memory and that real learning is construction of knowledge through observation, comparison, classification and analysis has led us to give a new thrust to the teaching-learning process at Vocational Higher Secondary level to make it more meaningful and learner-friendly.

This sourcebook has been developed primarily for the benefit of teachers who teach **Agriculture (Fruits and Vegetables)** at Vocational Higher Secondary level. The subject matter has been dealt with utmost care, in tune with the revised curriculum and pedagogic principles. It is hoped that this book will enable the teacher to provide suitable learning activities for effective learning.

The success of the approach depends upon the vision and commitment of the teacher. They are expected to make use of this sourcebook at all stages of their teaching process. It is also expected that the teacher would seek help and guidance from other sources like libraries and websites.

Hope that this sourcebook will help the teacher to develop the skills and experience required for effective classroom transaction.

Creative criticism and suggestions for improvement are most welcome.

With regards,

Thiruvananthapuram

July, 2006

**Dr E. Valsala Kumar**

**Director**

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# Contents

## **Part I**

i. Approach – General	5
ii. Subject Approach	26
iii. Learning Strategies	27
iv. Curriculum Objectives	39
v. Planning	41
vi. Evaluation	45

## **Part II**

1. Introduction to Pomology	56
2. Planting Systems	64
3. Tree Fruits	71
4. Other Fruits	76
5. Minor Fruits	81
6. Introduction to Olericulture	84
7. Types of Vegetable growing	90
8. Summer Vegetables	94
9. Cool Season Vegetables	99
10. Vegetable Seed Production	101
11. Post harvest technology	105
12. Preservation of Fruits and Vegetables	108
13. Packing & Storage	114

<b>Syllabus</b>	117
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# **APPROACH**

## **SIGNIFICANCE OF VOCATIONAL EDUCATION**

The ultimate aim of education is human refinement. Education should enable the learner to formulate a positive outlook towards life and to accept a stand, which suits the well being of the society and the individual as well.

The attitude and potential to work has determined the destiny, progress and cultural development of the human race. As we all are aware, the objective of education is to form a society and individuals having a positive work culture. The educational process expected in and outside our formal schools should concentrate upon inculcating concepts, abilities, attitudes and values in tune with these work culture. Hence vocationalised education cannot be isolated from the main stream of education. In another sense, every educational process should be vocationalised. However due to our inability to utilize the resources wisely, scarcity of job opportunities is a severe issue of the present society. For overcoming this deep crisis, emergent techniques have to be sorted out and appropriate researches have to be seriously carried out. It is in the sense that the content and methodology of Vocational Higher Secondary Education have to be approached. The need for meaningful linkages between the world of work and world of education is well recognized. The essence of the recommendations made by various commissions and committees is that the vocationalisation should be the main feature of the future system of education at the higher secondary stage; it can be extended to school level also.

Vocational education is system of education, which intends to prepare students for identified occupations, opening several areas of activities. The Vocational Higher Secondary course was envisaged as a part of the National Policy on Education with the noble idea of securing a job along with education. The relevance of vocational education is very great in this age of unemployment. This education system, which ensures a job along with higher education, stands aloof from other systems of education.

This education imparts the life skills required by the youth to enter the world of work and assuming the responsibilities of adulthood. As per the expert meeting report (2001) of UNESCO, the life skills are grouped under four categories. They are

1. Skills for personal fulfilment
2. Skills for living in society
3. Skills for dealing with changing economies
4. Skills for dealing with changing work patterns.

Vocational Education ensures fulfilment of manpower requirement for national development and for social security for the citizens through self-employment. It also helps to reduce the migration of rural youth to urban areas and thus helps in rural development.

The learners of Vocational Education get an opportunity to avail one year apprenticeship training in industries to improve their practical skill. During the course of study, on the job training (OJT) for 10 days in a year is arranged to improve the skill and efficiency of the learner. This education system motivates the attitude towards self –employment through Production Cum Service Training Centres. (PSTC)

### **OBJECTIVES OF VOCATIONAL EDUCATION**

The National policy on education has accorded very high priority to the program of vocationalisation of education, considering the following objectives.

1. To fulfil national goals of development and the removal of unemployment and poverty.
2. To impart education relevant to increased production and productivity, economic development and individual prosperity.
3. To make available skilled work force at all levels to alleviate the rural unemployment and for the development of nation.
4. To develop environmental awareness to ensure sustainable development.
5. To develop vocational aptitude, work culture, values and attitudes of the learners so as to enrich the productivity of the nation.
6. To develop entrepreneurial competencies and skills of learners for self-reliance and to undertake gainful self-employment.
7. To facilitate the expansion of higher education and explore future opportunities through innovative guidance and programmes.
8. To develop vocational competencies, creative thinking in the related areas and facilitate training.

9. To create awareness on mental, physical and social health.
10. To acquire awareness about different job areas and to provide backgrounds for accruing higher level training in subjects concerned.

## **Learning**

Learning is construction of knowledge through a continuous mental process. It is advancement through adding and correcting in the light of comparing the new issue with the previously learned concepts. Learning is an intellectual process rather than the mere memorization of facts. Learning is a conglomeration of a variety of activities like problem solving, finding out co-relations, prediction, arriving at conclusions, rational as well as critical thinking, finding applications, grouping for other possibilities and extracting the crux. When opportunities are provided for intellectual processes learning will become effective and intellectual ability will get strengthened.

## **Theoretical foundations of learning**

Education is the best device that can be adopted for creation of a new society. It should be democratic in content and process and should acknowledge the rights of the learner. It should also provide opportunity for better citizenship training. The concept of equality at all areas should get recognition in theory and practice. There should be conscious programme of action to develop nationality, humanness and love against the encroachment of sectarianism of caste and religion. The learner should become cognisant of the implications of privatisation, liberalisation, globalisation etc.

They should develop a discrimination to use the acquired learning as a weapon for liberation.

They should be able to view education and life with the perspective of social well being.

A basic awareness of all the subjects needed for life is essential for all students.

The remnants of perspectives formed in us during the colonial period still influence our educational philosophy. The solution to the present day perplexities of the society, which approaches education on the basis of competitions and marketisation, is only a comprehensive view of life.

It is high time that education was recognized on the basis of the philosophy of human education. The human approach to education has to reflect in its content, learning process

and outlook. The perspective of 'learning to be' and learning to live together as expressed by the UNESCO and the concepts of existential, intra-personal and interpersonal intelligence.

The basis of new approaches on curriculum and teaching- learning process are derived from the developments that took place in the east and west of the world.

When we begin to see the learner at the centre of the learning process, the teaching process has to be changed timely. It is the result of the rapid growth and development of Science and Technology and Pedagogy. If we want to undergo the changing process, we have to imbibe the modern hypothesis regarding learner that they have

- Great curiosity
- Good imagination
- Numerous other qualities and interests
- Independent individuality
- Interest in free thinking and working in a fearless atmosphere.
- Interest in enquiring and questioning.
- Ability to reach conclusions after logical thinking.
- Interest for recognition in the society.
- Determination to face the interference of society and make components which is a part of social life.

When we consider the learning system, the domains to be stressed in education according to the modern development become relevant.

**The knowledge domain consists of: -**

- Facts
- Ideas
- Laws
- The temporary conclusions and principles used presently by scientists.

The learning is a process. The continuous procedure we undergo to reach a particular goal is called the process. The skills, which are parts of the process to analyze the collected ideas and proofs and come to a conclusion, are called process skills. Some important *process skills* are,

- To observe
- To collect data and record
- To classify
- To measure and prepare charts
- To experiment
- To predict
- To recognize and control the variables
- To raise questions
- To generalize
- To form a hypothesis and check.
- To conclude
- To communicate
- To predict and infer
- To use tools.

**Observation** is the process of acquiring knowledge through the senses. It is purely objective oriented. Learning experiences, which provide the use of all the senses, may be used.

The process of grouping is known as **classifying**. Starting from simple groupings of data, it can extend to the level of classification into minute sub-groups.

In addition to this, consider the skills related to creative domain also, they are

- To visualize
- To connect facts and ideas in new ways.
- To find out new and uncommon uses of objects
- To fantasize
- To dream
- To develop creative isolated thoughts

Creativity is an essential component of process and activities. The element of creativity

is involved in finding out problems, formation of hypothesis, finding 'solutions' to problems etc. Through activity oriented learning experiences, opportunities to express creativity can be created.

Again, the following factors consisting in the *attitudinal domain* are also important as;

- Self-confidence
- Love for scientific knowledge
- Attitude to know and value history
- Respect human emotions
- Decide with reasonable present problems
- Take logical decisions regarding personal values

'Hypothesis' is a temporary conclusion drawn using insight. Based on knowledge and experiences relating to the problems the causes and solutions can be guessed.

As regards the *application domain* the important factors are the ability to:

- observe in daily life examples of ideas acquired.
- take the help of scientific process to solve the problems of daily life.
- choose a scientific life style
- connect the ideas acquired with other subjects.
- integrate the subjects with other subjects.

Some basic stands have to be taken on the new scientific knowledge about intelligence learning and teaching. When such basic concepts are accepted changes are required in the following factors.

- The vision, approach, structure and content of the curriculum.
- The vision, approach, structure and content of the textbooks.
- Role of the teacher and the learner.
- Learner atmosphere, learning materials and learning techniques.

Some scientific perspectives accepted by modern world in educational psychology are given below.

## **Constructivism**

This approach puts forward the concept that the learner constructs knowledge. New knowledge is constructed when ideas are examined and practiced in new situations relating them with the previously acquired knowledge and experience. That is assimilated into the cognitive structure of one's knowledge. This method, which gives priority to critical thinking and problem solving, provides opportunity for self-motivated learning.

## **Social Constructivism**

Social constructivism is a sub section of constructivism. Knowledge is formed, spread and imbibed and it becomes relevant in a social environment. Interactive learning, group learning, co-operative participatory learning, all these are concepts put forward by social constructivism.

The main profunder of constructivism are Piaget, Vygotsky and Bruner.

Discovery learning and interactive learning have prime importance. Learning takes place as a part of the attempt for problem solving. The activities of a learner who confronts cognitive disequilibrium in a learning situation, and when he tries to overcome it leads to the renewal of cognitive structure. It is through this process construction of new knowledge and the assimilation of them takes place. Observation and enquiry are unavoidable factors. The learner advances towards new areas of acquisition of knowledge where he tries to compare his new findings with the existing concepts.

Learning is a live mental process. Rather than the ability for memorization of facts cognitive process has to be given emphasis. The process of problem analysis, elucidation, critical thinking, rational thinking, finding out co-relation, prediction, hypothesis formation, application, probing for other possibilities, extracting the crux and other processes are of critical importance in learning.

Constructivism gives greater predominance to co-operative learning. Social and cultural factors influence learning. Sharing of knowledge and experience among learners, collective enquiry, assessment and improvement, group activity and collaborative learning by sharing responsibilities with the objective of public activity, provide opportunity for effective learning.

In learning internal motivation is more important than external motivation. The learner should have interest and initiative in learning. Learning situation should be capable of forming a sense of ownership in the learner regarding the learning process.

Learning is not a linear process. It progresses in a spiralled way advancing deeper and wider.

## **NEW CONCEPTS OF LEARNING**

### **1. Discovery Learning**

The teacher has to create a motivating atmosphere for the learner to discover concepts and facts, instead of listening always. Creating occasion to progress towards discovery is preferred. Instead of telling everything before and compelling to initiate the models, situations are to be created to help the children to evolve models themselves.

### **2. Learning by discussion**

Discussion leads to learning is Burner's theory. Here discussion is not opposing each other. It is a sharing on the plane of ideas. New ideas are arrived at by seeking explanations, by mutual giving and taking of ideas and by problem solving.

### **3. Problem solving and learning**

Only when the learner feels that some thing is a problem to be solved that he takes the responsibility of learning it. It is an inborn tendency to act to solve a problem that causes cognitive disequilibrium in a particular area. It is also needed to have confidence that one is capable of doing it. The problems are to be presented in consideration to the ability and level of attainment of the learner.

### **4. Collaborative learning**

This is the learning in which the responsibilities are distributed among the members of the group keeping common learning objectives. The common responsibility of the group will be successful only if each member discharges his duties. All the members will reach a stage of sharing the result of learning, equally through the activity with mutual understanding. The teachers who arrange collaborative learning will have to make clear the responsibilities to be discharged. This is possible through the discussion with the learners. Collaborative learning will help to avoid the situations of one person working for the whole group.

### **5. Co-operative learning**

This is the learning in which the learners help one another. Those who have more knowledge, experience and competency, will help others. By this exchange of resources

the learners develop a plane of social system in learning also. As there are no high ups and low ones according to status among the learners they can ask the fellow students doubts and for help without any hesitation. Care should be taken not to lead this seeking of help to mechanical copying. It should be on the basis of actual needs. So even while encouraging this exchange of ideas, among the members of the group cautious acceptance is to be observed as a convention. There should be an understanding that satisfactory responses should come from each member and that the achievement of the group will be assessed on the basis of the achievement of all the members

### **6. Zone of Proximal Development**

Vygotsky observes that there is a stage of achievement where a learner can reach by himself and another higher zone where he can reach with the help of his teachers and peers and elders. Even though some can fulfil the learning activity by themselves there is the possibility of a higher excellence. If appropriate help is given, every learner can better himself.

### **7 Scaffolding**

It is natural that the learner may not be able to complete his work if he does not get support at the proper time. The learner may require the help of the teacher in several learning activities. Here helping means to make the learner complete the activity taking responsibility by himself. The teacher has to keep in mind the objective of enabling the learner to take the responsibility and to make it successful.

### **8 Learning - an active mental process**

Learning being a cognitive process, the teacher needs to know cognitive processes to facilitate the creation of learning opportunities. Learning can be made effective by providing learning experiences involving mental processes like

- Retrieves/recollects/retells information
- Readily makes connections to new information based on past experiences and formulates initial ideas /concepts.
- Detects similarities and differences
- Classifies/categories/organizes information approximately.
- Translates/transfer knowledge or understanding and applies them in a new situation.
- Establishes cause-effect relationships

- Makes connections/relates prior knowledge to new information/applies reasoning and draw inferences
- Communicates knowledge/understanding through different media.
- Imagines/fantasies/designs/predicts based on received information
- Judges /appraises/evaluates the merits or demerits of an idea/develops own solutions to a problem.

### **9. Intrinsic Motivation**

Intrinsic motivation is given more importance than extrinsic motivation. The teacher has to arouse the internal motivation of the learner. A person internally motivated alone can immerse in learning and own its responsibility.

### **10. Multiple intelligence**

The Theory of Multiple Intelligence put forward by Howard Gardener has created a turning point in the field of education. The National curriculum documents has recommended that the curriculum is to be designed taking into consideration of this theory.

## **MAIN FACTORS OF THE INTELLECT:**

### **1. Verbal/linguistic Intelligence**

Ability to read and write, making linguistic creations, ability to lecture competence to effective communication, all these come under this. This can be developed by engaging in language games and by teaching others.

### **2. Logical/mathematical Intelligence**

Thinking rationally with causes and effect relation and finding out patterns and relations come under this area. Finding out relations, explaining things, sequential and arithmetical calculations etc. are capable of developing this area of intelligence.

### **3. Visual/spatial Intelligence**

In those who are able to visualize models and bringing what is in the imagination into visual form and in philosophers, designers and sculptors this area of intelligence is developed. The activities like modelling using clay and pulp, making of art equipments, sculpture, and giving illustrations to stories can help the development of this ability.

#### **4. Bodily Kinaesthetic Intelligence**

The activities using body language come under this. This area of intelligence is more developed in dancers and actors who are able to express ideas through body movements and in experts in sports, gymnastics etc.

#### **5. Musical Intelligence**

This is an area of intelligence, which is highly developed in those who are able to recognize the different elements of music in musicians and in those who can hear and enjoy songs. Playing musical instruments, imitating the songs of musicians, listening silently to the rhythms and activities like this are capable of developing this area of intelligence.

#### **6. Interpersonal Intelligence**

Those in whom this area of intelligence is developed show qualities of leadership and behave with others in a noble manner. They are capable of understanding the thought or others and carrying on activities like discussion successfully.

#### **7. Intrapersonal Intelligence**

This is the ability to understand oneself. These people can recognize their own abilities and disabilities. Writing diaries truthfully and in an analysing way and assessing the ideas and activities of others will help developing these areas of intelligence

#### **8 Naturalistic Intelligence**

A great interest in the flora and fauna of the nature, love towards fellow beings interest in spiritual and natural factors will be capable of developing this area.

#### **9. Existential Intelligence**

The ability to see and distinguish our own existence as a part of the universe, ability to distinguish the meaning and meaninglessness of life, the ability to realize the ultimate nature of mental and physical existences, all these are the peculiarities of this faculty of intelligence.

### **EMOTIONAL QUOTIENT**

The concept of emotional intelligence put forward by Daniel Golman was used in framing the new curriculum. The fact that one's Emotional Quotient (E.Q) is the greatest factor affecting success in life is now widely accepted. The teacher who aims to focus on improving the emotional intelligence of students need to concentrate on the following.

**i) Ability to take decisions**

Rather than imposing decision on students while planning and executing activities, the students may be allowed to take part in the decision making process. Taking decisions through open discussion in the class, inviting students suggestions on common problems etc. are habits to be cultivated.

**ii) Ability to reach consensus**

- When different opinions, ideas and positions arise, the students may be given the responsibility to reach a consensus.
- Imagining what would be the course of action in some situations, allowing to intervene in a healthy way in problems between individuals.

**iii) Problem solving**

- Developing the idea that there is reason and solution to any problem.
- Training in finding reasons for problems.
- Suggesting solutions through individual or group efforts.
- Discussing social problems.
- Analyzing the shortcomings in methods to solve problems.

Whether plastic can be banned within school premises can be given as a problem. Group discussion will provide reasons and solutions. Problems, which can influence classroom learning and for which the learner can actively contribute solutions need to be posed.

- Self criticism, evaluation
- Ability to face problem-situation in life
- Thinking what one would do if placed in the situation of others, how one would respond to certain experiences of others - All these foster the growth of emotional intelligence.

**iv) Life skills**

Life skills need to be given a prominent place in education. W.H.O. has listed: skills required for-success in life.

- Self awareness
- Empathy
- Inter personal relations

- Communication
- Critical thinking
- Creative thinking
- Decision making
- Problem solving
- Coping with emotion
- Coping with stress

The new curriculum addresses these areas.

Knowing the characteristics of the learner, role of the teacher and how to use the teachers' handbook help the teacher to plan and effectively implement learning activities.

### **Role of a Teacher**

In the earlier approach the teacher was mainly depending on the lecture method for teaching. But in the new method of education, the student centred approach is given more importance than the teacher centred approach. Under this changed scenario the teacher has to perform the following roles in the classroom.

#### **The teacher should be**

- A facilitator of learning
- A guide to the overall development of the student
- A good observer and motivator
- Able to consider the activities, needs, special features and age group of students at higher secondary level.
- Able to understand the limitations of learner and their learning problems.
- An instructional material developer
- A good communicator
- An innovator
- Able to raise leadership qualities and self confidence of the learner
- An authority in the concerned subject
- Able to arrest and sustain the attention of the learner

- Able to bring out and encourage the inborn talents.
- A resource manager to ensure the optimum utilization of resources.
- A systematic record keeper
- A controller to issue guidance to the students
- A person with high level of practical competency
- Able to correlate area of study with familiar environmental situations
- A self evaluator and good listener
- Able to create awareness in social problems
- A person with democratic and humanitarian approach
- A professional as well as a philosopher
- A good evaluator
- A good organizer and a friend.
- A co-learner as well as co-researcher
- Able to give assistance and advice in placement needs and self employment by giving moral and technical support
- Able to keep moral values
- A person equipped with skill for using new techniques of learning
- Optimistic and impartial

### **Child friendly Class Room Atmosphere**

Learning can be effective and enjoyable only when the class atmosphere is according to the new conception of learning and the characteristics of higher secondary teacher.

- Class and seating are arranged in an attractive way
- Democratic nature is upheld
- Always active
- Students interact with teachers without fear
- Opportunity for a variety of activities
- Students allowed to involve interesting group activities
- Learning speed, learning style and differencing levels of attitudes are considered. Help is extended whenever needed.

- Sufficient instructional materials are available
- There is freedom of expression, students share their ideas and experiences
- Students are given acceptance and encouragement
- Healthy atmosphere
- Needs of each student are given consideration. Happy and energetic atmosphere
- Teachers work considering the rights of students
- Problems handled with patience.
- Teachers work at all events from the students view point

There will be students of various ability levels in any class because learning style, learning speed, varying exposure to language experiences, physical and psychological problems and varying socio-cultural background.

The learning experiences provided must help to bring the low active to an expected level and extended the breadth and depth of the skills of the high active.

By repeating experiences, introducing variations in a learning experience to suit different levels and if needed, formulating additional experiences the problem of varying ability levels can be tackled.

### **Role of Learner**

The learner in second year has undergone a learner centred and process oriented learning experience up to first year. The learner at this age is in awakening stage and he is enthusiastic about environment. He needs recognition and encouragement from environment and also recognize as a grown up man. He is adequately competent to select vocational subjects according to his aptitude and interact and to acquire higher education and profession as he wishes. The aspirations about future life are framed in this particular age for seeming national and international job opportunities. Some of the peculiarities of learner at this stage are;

- Physical, intellectual and emotional planes are intensive, changes during the age and in their reflections can be observed
- Ability to enquire discover and establish cause effect relationship between phenomena
- Readiness to undertake challenges

- Capacity to shoulder leadership roles
- Attempt to interpret oneself
- Susceptibility to different pressures
- Doubts, anxieties and eagerness about sex
- Imaging for social recognition

### **Role of learner**

- Active participant in the learning process
- Act as a researcher
- Sharer of information
- Sharer of responsibilities
- Collect information
- Takes leadership
- Involves in group work
- Act as a co-participant
- Observes his environment
- Experiments and realize
- Make interpretations and draw inferences
- Mould himself in to an active contributor for the welfare of the society.

### **Needs of Learner**

- To make acquaintance with a job or self employment through vocational education
- To acquire more knowledge in the concerned area through higher education
- To recognize and encourage the peculiar personality of the later adolescent period
- To enable him to defend against the unfavourable circumstances without any help

### **Evaluation**

In vocational higher secondary education, a new approach to education and evaluation should be made. Evaluation must be a systematic and continuous process. As the curriculum is based on vocational stream, capacity building is a most important part and it should be evaluated accordingly. The technical skills, interest in the particular field, communication skill, analysis, organizing and presentation skills etc has to be evaluated. The personal and

social qualities also have to be evaluated. Therefore, evaluation should be transparent, continuous and comprehensive.

### **Monitoring system**

Education is a kind of journey from darkness to light satisfying the needs and the wants of the individual and the society. The modernization of education through activity-oriented system enhances free thinking and working in a fearless atmosphere. It is a qualitative process not a quantitative one this necessitates a proper monitoring system. The system of monitoring should have the following features.

- 1) It must be transparent
- 2) It must enrich the ideas of the facilitator through innovative process
- 3) It must be time bound and rational
- 4) It must motive the facilitator to adopt new strategies
- 5) It must be recordable and ensure effective feedback for the effective monitoring of the system; three levels of the mechanism should be set up.
  1. School level monitoring group
  2. Regional level monitoring group
  3. State level monitoring group

Moreover a social auditing system is advisable to attain the objective effectively.

#### Features of learning process in the new system of education

In the new system of education the learning process should be modified in such a way as to enable the learner to construct the knowledge of his own through observation, co-operation, problem solving, social interaction etc. The learning process should consider the nature ability, social set up, inborn talents and subject selected by the learner. Therefore the learning process should be,

- A continuous mental process
- Simple learner must feel that he is able to undertake the task
- Enable the learner to attain the curriculum objective
- Interesting

- Suitable to the age and attitude of the learner
- Future possibilities
- Enable group activity
- Challenging
- Time bound
- Constructive and curiosity developing
- Possibilities for evaluation
- Capacity to generate independent thinking
- Ability to enquire, discover and establish cause effect relationship between phenomena.

### **Supporting System**

In learner centred vocational education, a learning methodology has to be organized and a proper learning atmosphere is to be provided. Many organizations can support the learning activity. They are:-

**1) School Resource Group (SRG)**

Comprising all teachers (vocational and non vocational) instructors, and lab assistants with academic head as the group leader.

**2) School support Group (SSG)**

Comprising PTA president, members of local bodies, members of social clubs, subject experts etc who can contribute through guidance /technology /infrastructure /financial assistance etc.

**3) Parent Teacher Association (PTA)**

Can provide adequate funds for field trips, production cum training centers (PCTC), exhibition, On Job training (OJT) etc.

**4) Local bodies**

Grama Panchayat, district panchayat and block panchayat can provide infrastructure ie, class rooms, laboratory, library, seminar hall, audiovisual equipment etc.

**5) Subject club**

All vocational teachers handling same vocational subjects should form a subject at

regional level or district level. This will help to share the knowledge and practical facilities, production and marketing of materials, service etc.

- 6) Based on the Excellency, district wise nodal schools may be selected to provide facilities like central library, museums, video conferencing etc.

**7) Institution Industry Interaction Project (III P)**

This should be implemented in every institution to update knowledge this also helps for OJT , PCTC and field visit.

### **Learning Aids**

To make the teaching and learning process simple and effective, certain learning aids are necessary. Use of such aids for transacting a complex idea makes the classroom live and students get more and more involved. The advances in science and technology may be effectively utilized for this purpose. Some of the learning aids listed below.

- Multimedia
- Over Head Projector
- Computer
- Internet
- Liquid Crystal display Projector
- TV, VCD, DVD and tape recorders
- Working models
- Charts
- Slides
- Video Conferencing facility
- Library
- Text book
- Source book

### **Society**

The new educational policy uplifts the social commitment of the learner. Therefore the society can also give some valuable contributions in this changing situation. The new system also ensures that the learner can perform certain useful services for the betterment of society. The social obligations can be illustrated as follows.

- To enrich social values, aptitude and ability in learner
- To develop entrepreneurial aptitude and ability which helps social welfare and self employment
- New system of education adopts OJT, PSTC etc as a part of vocational curriculum, which helps to make close contact with the society.
- The resources available from our society can be positively utilized to convene seminars, interview etc.
- Social organizations can help learners to make their education socially committed.
- The social clubs like NSS, Tourism club, CDO club, energy club etc functioning in schools can make direct link with the society

### **Learning Approach**

A learner centred and activity based learning approach is to be adopted. The many sided intelligence of the students should be explored to gain in depth knowledge. The method of teaching should be based on the students needs, their expectations and interest. Their participation also should be ensured . For this we can adopt different strategies and techniques.

#### **1. Discovery learning**

The teacher has to create an atmosphere that encourages the learner to discover ideas and facts on his own. For example, the teacher can assign the student to identify the characteristics of different insects. This gives an opportunity for the learner to observe different insects in their surroundings or they can collect information from different sources like internet and print media. Their observation can be consolidated in to the product.

#### **2. Co-operative learning**

In this method, the learners learns by helping each other. The negotiations among peers take place here.

For example, if we want to create awareness among the students about different methods of insect control commonly used in households, students can be divided in to different groups and a group discussion on the topic can be conducted. The ideas evolved from the discussion can be consolidated and presented in the class.

**3. Collaborative learning**

The two important aspects of this method of learning are sharing of ideas and negotiation among the learners. Suppose we want to deal with different types of formulations. Here also they can be divided in to groups and the teacher can ask them to collect information on different pesticide formulations and their characteristics. Their observation can be consolidated and presented in the class.

**4. Socio-cultural related learning**

This method of learning pertains to the social and cultural aspects of the society. For example: An interview can be conducted by the learner to study the impact of pesticides on environmental pollution.

## **SUBJECT APPROACH**

India's production of fruits and vegetables accounts to 143 million tones and the area under cultivation is about 11 million hectares. Fruits and vegetables are essential for a balanced diet and maintenance of good health. They supply vitamins, minerals, carbohydrates and proteins, which are very essential for the body. Fruit and vegetable processing industry occupy a unique position among the different sectors of the food processing industry.

Agriculture (Fruits and vegetables) is a vocational course which enables the student to come across the following topics :

1. Important fruits cultivated in Kerala and their cultivation aspects
2. Propagation techniques of major fruits.
3. Important vegetables cultivated in Kerala and their cultivation aspects
4. Vegetable seed production
5. Modern preservation techniques of fruits and vegetables
6. Measures to overcome spoilage of fruits and vegetables.

The government is promoting commercial processing units through various schemes. A student undergoing training in Fruits and Vegetables course alone can become a licensed practitioner of commercial production center. In addition, he can practice Papain extraction, tuty-fruity preparation, preparation of jam, jelly, squash and pickles. As various propagation techniques are involved in the cultivation aspects, he can practice these techniques and start a nursery unit of his own. F&V student gains expertise in laying out an orchard.

In the present era of decentralization, Kudumbasree units play a major role in revolutionizing the society. F& V students supply sufficient information regarding layout of a kitchen garden, cultivation aspects and thus providing pesticide free fruits and vegetables to the family. In addition, training programmes on processing can also be organised by them.

In short, Fruits & Vegetables course opens self-employment avenue in commercial processing industry, nursery business & vegetable seed production.

# LEARNING STRATEGIES

In the modern era of globalization the introduction of new technologies ensure only the survival of the fittest. So it becomes a necessity to equip the leanness to face the growing challenges in the competitive world. Hence the traditional approach to learning is no more relevant in the present context. The teacher should use instructional techniques that motivate the learner to construct his own knowledge. Now the learners are not passive listeners, but they are the active participants in the construction of knowledge. Here the teacher – learner interaction should be given much importance.

In the new instructional strategy while selecting the methods of teaching, the social and psychological aspects of the learner is to be taken into consideration. The given activities for learning are only suggested one. It can be altered according to the discretion of the teacher.

To obtain the objectives, the new system of education is introduced in the Vocational Higher Secondary Education for attaining the objectives of the courses in this system, we can adopt the following strategies.

## **1. Assignment**

Assignment is some specific work assigned to the learners as a part of their academic enrichment. There are learning activities undertaken as a continuation of class room activities to realize the curriculum objectives to a broader extent. They should be completed in time bound manner. They help to lead learner to higher level of learning from the present status. Challenging assignment can motivate the learners to involve in group dynamics and achieve fruitful results. The teachers may act as a guide.

Assignment may be given on individually or on group basis. Assignment includes preparation of notes, preparation of charts, models, collection, of materials from institutions etc. Assignment develop skills of reference, observation, enquiry reporting etc. It ensure the effective utilization of leisure time of the learners.

## **2. Seminar**

Seminar is a learning strategy involving an in-depth analysis of specific topic, preparation of a paper and presentation. The paper is presented by either one learner or a group of learners. After the presentation, there will be a discussion/ interaction in which all the learners can participate. The learners get an opportunity to clear their doubts and make clarification. Seminar helps to develop communication skill and overcome stage fright.

### **Stages**

#### **1. Selection of Topic**

The topic of seminar should be relevant to the subject of study

#### **2. Assignment of topic to individuals learners or team**

The topic may be assigned to each learner or subtopics may be given to a group of learners

#### **3. Collection of relevant information**

Information required for seminar can be collected from various sources namely books, magazines, internet, institutions, place and persons.

#### **4. Preparation of draft paper**

Based on the information collected the learner may prepare a draft paper and submit it to the teacher for comments. Revise the draft paper based on the comments of the teacher. The required draft is submitted for approval.

#### **5. Program Scheduling**

The date, time and venue of the seminar is fixed. A seminar leader may be selected from the learners

#### **6. Seminar paper presentation**

The learner/ learners shall present the paper in the seminar. The teacher may function as the moderator during the initial stages.

#### **7. Discussion / Interaction**

A number of respondents from the learners make comments on the topic. This will be followed by a general discussion. All the group members should actively participate in discussion.

**8. Summing up deliberation**

The moderator sums up the deliberation

**9. Evaluation / Feed back**

Both teachers and learners evaluate the programme.

**10. Preparation of final report**

A final seminar report is prepared covering all the additional points discussed and consolidated.

**3. Panel Discussion**

It is a learning strategy in which a panel of experts are allowed to discuss a specific subjects under the control and direction of a moderator. Subjects can be divided according to the number of panel members. Number of panel members are fixed according to subdivision of points in the subject. Relevant materials and hand out may be given in advance to the learners. The monitor or moderator introduces the subject of discussion and invite a panel member to start the discussion. Each panel member is invited for discussion afterwards. After briefing by the panel members the question are raised from the audience and the panel members give suitable answer to them. A report should be submitted by each learner to the moderator.

**4. Project**

Project is a self-learning strategy which can exert great influence on the overall development of the learner. Project as learning strategy is to be selected where a problem arises in any part of the curriculum. The learners may be divided into groups and assigned different aspects of the problem. Each group works independently .Specific aspects of the problem such as data collection, classification, analysis, report preparation and presentation is to be undertaken by each of the members. Even though the work is divided among the members, it must be ensured that the execution of each and every activity is done with the active participation of all. After analyzing data collected from different sources, the learner arrives at a conclusion, which helps to solve the problem. There by learner learns the topic through his own activity. The other advantage of this learning activities is that it helps the learner to scientifically handle any problematic situation. It helps in the development of scientific thinking and thereby builds up the learners aptitude for the subject.

## **Stages of the project**

### **1. Selection of a topic**

The project selected should be related to the curriculum and it should not be a project for projects sake. The topic or problem should arise from the curriculum.

### **2. Planning of the Project**

(A) Hypothesizing: Hypothesizing means making assumptions based on the available primary information.

(B) Methods and Techniques : The methods and technique should be based on the aim and Hypothesizing of the project. The nature of the project, suitability of the tools, and the methods of learning should be related to each other.

### **3. Collection and Tabulation of Data**

The data may be primary, Secondary or tertiary. Either census or sampling method can be used based on the objective of the project. Suitable questionnaires are to be prepared for the collection of primary data.

The collected data is to be classified and tabulated so as to make it easily understandable.

### **4. Analysis of data and formulation of conclusion**

By analyzing the data, the reliability of the hypotheses can be examined. Preparation of graphs and diagrams and maps will positively help the analysis. The similarities relations and differences gathered from the analyzed information would tell whether the hypotheses should be accepted or rejected.

### **5. Preparation of Report**

The cover page should have the title of the project, the period of study, name (s) of investigator / group, and the address of the school. The report should be structured in the following order.

1. Title
2. Preface
3. Hypotheses and aim
4. Methodology
5. Sources of data

6. Analysis and conclusion
7. Suggestions (if any)
8. References
9. Appendices (Questionnaire, Observation schedule, check list Etc.)

## **6. Presentation of the Project**

When the project is presented, the learner is being evaluated and accepted. During presentation ideas are shared with others. The project method promotes scientific self learning and makes him capable of solving the problem arising in real life situations.

## **5. Debate**

Debate is a hot and interesting learning activity. A debate can be organized only on a topic on which there is difference of opinion. Therefore a topic suitable for debate has to be found.

Debate can be on relevant topic that is different and interesting to the learners and relevant to society. Learners with different opinion have to be identified for discussion. Those who have similar opinion should join together to form a side. Those who hold the opposite view form the other side. It would be good to write down the topic of the debate and displayed in advance. There should also a person to control debate.

Learners should be given opportunity to absorb the ideas obtained from discussion and debate, develop the idea through reading and study, and to express them through writing or other means

### **Stages of Debate**

1. Topic Selection
2. Selection of panels keeping in balance with intelligence, gender etc.
3. Selection of moderator
4. Collection of information guided by the teacher
5. Conducting the debate under the control of moderator by avoiding any sort of personal conflicts
6. Conclusion by the moderator expressing his final version or verdict.

## **6. Case Study**

A case may be a person, institution or a community case study is an in depth analysis of an actual event or situation. It presents real pictures of situation with facts, objective information or data learners analyse the case to interpret, predict and resolve issues associated with it. The case study provides the learner an opportunity to analyse and apply concepts, data and theory taught in the class. Learners can work individually or in groups.

By studying realistic cases in the classroom, learners develop new insights into the solution of specific on- the - job problem and also acquire knowledge of the latest concepts and principles used in problem solving.

Case may be presented by the teachers or may be provided in print form.

A simple case study may have the following steps.

1. Collection of data
2. Conversion of data into information
3. Analysis of the case in groups
4. Presentation of the finding by each group leader.
5. Evaluation

In addition to the above mentioned learning strategies there are many other learning strategies which can be used in appropriate situations to enrich learning process such as Problem solving, Role play, Brain storming, etc

## **7. Brain Storming**

This is the best method for solving creative problems. It facilitates generation of ideas quickly. Rules for conducting Brain storming.

1. No response is wrong - welcome every response.
2. Welcome as many responses as possible
3. No criticism is allowed
4. Allow to work on others idea

### **Steps in Brain storming**

1. Presentation of the problem
2. Provide relevant information

3. Record the ideas put forth by the participants
4. Combine similar ideas
5. Evaluate each idea and solution
6. Selection of the best solution

If brainstorming is used as an instruction strategy, the last step is not essential

## **8. Discussion**

Discussion is essential for the learner to share new finding, ideas and conclusion at each stage of learning with follow learners and teachers. In general discussion the teachers should guide the discussion though questioning and summarizing. The major steps involved are

1. Introduction initiated by the teacher
2. Development of discussion by giving lead points and follow up interactions
3. Transaction stage in which the key points are reviewed by the teacher and
4. Summarizing stage in which teacher provides additional support materials to ensure the achievement of the objectives

## **9. Group Discussion**

Group discussion is an ideal method to develop Co-operation, democratic attitude, friendliness and compromising attitude which are the ultimate aims of education. During group discussion the teacher may observe each group and it needed help them to channellise the discussion towards the common objectives. All learners may be given opportunity to take part and express their ideas within a time limit. The conclusion reached may be entered by each learners. A group representative must present this during consolidation in which the teacher may correct or add information's to ensure that all the relevant ideas have been covered

## **10. Collection**

Collection is a continuous learning activity, which ensure complete participation of learners. The collected item may be materials, pictures, charts, ideas, data etc. Collection provides direct experience to learn. An exhibition of collected materials will help to strengthen the concept.

## **11. Practical works**

Experimentation contains the process skill in an integrated way. In the new approach of curriculum the learner forms idea and comes to conclusion though process. The term

‘Practical’ when associated with a science subject usually means an experiment. The objective of doing an experiment is to explore new ideas through investigation only. Its main purpose is to verify some principles associated with theory. The relevance of ‘practical’ in the traditional science subjects ends here. But this is not the case with ‘Vocational Practical’

The ultimate goal of a Vocational Education is to generate skill through continuous practice along with investigation and invention. Continuous practice transforms the unskilled to the skilled. This is the significance and importance of practical in the Vocational stream. Hence it is very crucial that Vocational teachers as well as instructor should understand the importance of vocational practical and act accordingly.

## **12. Quiz**

Quiz programmes can be used as an interesting class room tool for transaction of curriculum objectives as well as to evaluate the effectiveness of transaction and achievement of learners.

For conducting a quiz programme a topic should be selected based on the above objective

The learners are asked to prepare question based on the topic individually. The next day / next hour the learners are grouped into 3-4 groups randomly. A question is raised by a particular team and the other teams to answer them if they can answer the question they get points for that if all other teams fail to answer the question raised by the 1<sup>st</sup> team the 1<sup>st</sup> team answer the question and explain the background if necessary. All the teams get equal number of chance to ask the question . Time limit is also prescribed for the conduction of the programme. The team who scores maximum points wins

All the participants can make notes on the questions asked answer and their explanation which help them in learning

## **13. Models**

Models are used in learning process. They enhance the leaning experience. This is based on the ‘seeing is believing’’. It helps the learner a chance to see feel the model presented . Still models and working models help the learners to understand the structure, working principles, actual operation etc.

**Several steps are involved**

1. Feeling the problem
2. The teacher should plan the type of model according to curricular objectives.
3. Grouping the learners
4. Briefing the tasks
  - Aim
  - Need
  - Material required
  - Source & Materials
  - Cost of materials
  - Division of Labour
  - Guidance
  - Fixing of a time limit
5. Presentation by each group about
  - (A) How the models were prepared
  - (B) Details of
    - Expenses
    - Working and principlesFinally Documentation of the process
6. Evaluation
  - By the other groupsLater a consolidation by teachers is to be done.

**14. Games**

Class rooms can be made attractive by introducing different types of games. Games should be interesting as well as informative some of suitable games are

1. Odd man out
2. Cross word puzzles
3. Match the following
4. Aswamedham.
5. Link game – Answer using clues.

## **15. Survey**

This strategy involves collection of data from the group under study (book, person, materials etc.) It develop the social interaction and communication ability of the learner. It also provide a scope for discovery learning.

### **Step involved in survey**

- Objective of survey
- Selection of area for survey/sampling frame
- Selection of survey method
  - .Direct method
  - With help of questionnaire/schedule
- Tabulation and analysis
- Considation and Presentation

## **16. Exhibition**

It is a learning strategy by which the learner can get a chance to show the skill developed. It provides the intrinsic motivation and exposure.

Exhibition item can be conducted either individually or as a group task. It can be conducted at school / Regional/State/National Level. Necessary publicity and other arrangement can be provided. Presentation, documentation participation and innovative skills of the learner can be evaluated.

## **17. Interview**

Interview is one of the important learning strategies taking the help of a resource person. Interview is an inner view which provides opinion and information about a topic.

An interview is conducted by the following steps

1. How to introduce a problem?
2. Invite a resource person
3. Decide the questions by learners
4. Decide the time, place etc.

5. How to discuss
6. How many learners to participate
7. Implementation of the interview
8. Conclusion (Facilitator)

**Items required**

1. Interview Schedule

List of question prepared by learners  
Selection of learners, selected names  
sequence of question

**18. Field Visit**

Field visit is an inevitable vocational tool to be implemented in vocational Higher Secondary Education. This helps the learners to familiarise with the modern technologies and new situation in a different atmosphere. It provides learning through viewing. It is based on the principle that seeing is better than having. It enables the learning to retain the learned informations longer and to make the subject more interesting. It motivates and give more confidence in his/her particular vocation.

The facilitation should identify suitable center/ institution/site. Get prior permission from the authorities before conducting the field visit. Give instructions to the learners for collection data's/information's/materials/Specimens. Teacher may assign different duties to learners by working them different groups.

Each learner should take utmost care and interest during the visit. He/She should observe and interact at the center/ institution where the field visit is conducted

After the visit, learner should acquire the ability to apply the ideas/concepts in his future carrier. Each learner should submit a detailed repot about the field visit.

**19. Method Demonstration**

Though demonstration we can present an item/product and emphasis its features very effectively In method demonstration the facilitator explains the procedure; tools used and demonstrate the actual operation. The learner observes the procedures and makes notes. After the demonstration he clarifies his doubts and repeats the procedure all by himself. Mean while his way of doing is carefully monitored by the facilitator and suggests corrective

action if any. At the end of this activity the learner gains adequate skill in the procedure and improves self confidence.

Eg:- To understand the method of preparation of Jam.

1. Material/Item/Process
2. Demonstration
3. Venue
4. Additional requirements depending upon the nature of the item

#### **Demonstration Process**

1. Introduction about the item/Material
2. Principles – Working
3. Operation
4. Components
5. Merits of the item

## **20. Chart display**

It is also one of the important teaching aid. It can be used in every activities of a learning process.

Chart display is a written or pictorial representation of idea or concept. It is brief and clear.

#### **Benefits**

1. A learner gets clear idea about the concept
2. The learner can retain the ideas in his mind for longer periods
3. A complicated idea can be simplified through a chart
4. Cheap method of teaching aid.

# **CURRICULUM OBJECTIVES**

## **Curriculum Objectives**

- Learner defines fruits and pomology and understands the various types of fruits, their economic, nutritional and medicinal importance through collection and identification, brainstorming and prepares discussion notes.
- The learner understands the present status of area and production of fruit trees country wise and state wise, the factors affecting fruit production, problems and measures to overcome through assignments, discussion and prepares reports and discussion notes.
- Learner gets an idea about the classification of fruits based on climatic requirements through brainstorming and discussion and prepares notes.
- The learner understands the different systems of plantings, its advantages and disadvantages through field trip, discussion and demonstration and prepares notes and reports.
- Learner gets an idea about the layout plan of an orchard, principles and practices of growing tree planting through discussion and method demonstration by preparing notes with diagrams.
- Learner gets experience in the cultivation practices of major fruit crops of Kerala like Mango, Jack, Sapota, guava, citrus and cashew through brainstorming, group discussion, interview and prepares discussion notes and reports.
- Learner understands the cultivation practices of important fruits like banana, pineapple and papaya through collection of secondary sources, discussion and demonstration and preparing notes.
- Learner develops an idea about the use of growth regulators in pineapple and papain extraction through field visit, method demonstration and discussion and preparing notes.
- Learner identifies the minor fruits and their places of growing – Grapes, Mangosteen, Litchi, Avocado, Pomegranate, Citrus fruits, Apple, Pear, Peach, Plum, Cherry,

Roseapple, Bilimbi, Starfruit, West Indian Cherry, Egg fruit, Lovi-lovi, Annona, Caronda etc. through identification, collection and discussion and prepares notes.

- Learner defines vegetable, olericulture and understands the economic, nutritive and medicinal importance of vegetables through brainstorming and discussion and prepares discussion notes.
- Learner understands the factors affecting vegetable production, problems, prospects and classification of vegetables through collection of specimens, group discussion and prepares tables and notes.
- Learner understands the different types of vegetable growing – kitchen garden, truck garden, market garden, vegetable forcing, vegetable seed production through discussion referencing secondary sources, demonstration and prepares discussion notes.
- Learner gets an idea of the cultivation practices of cucurbits, solanaceous vegetables, leguminous vegetables, amaranthus, okra, coleus, colocasia, amorphophallus and perennial vegetables through interview with farmers, group discussion and method demonstration and prepares reports and discussion notes.
- Learner gets an idea of the important cool season vegetables and their places of growing through collection, identification, referencing secondary sources, discussion and prepares notes.
- Learner understands the qualities of good seed, classes of seeds and various methods of seed production through referencing secondary sources, brainstorming and discussion and prepares notes.
- The learner acquires an idea about the different causes of spoilage of fruits and vegetables and importance of post harvest technology through collection of specimens, discussions and prepares notes.
- Learner understands the various methods of keeping the fruits and vegetables for shorter and longer periods through assignments, discussion and prepares reports and discussion notes.
- Learner practices the preparation of jam, jelly, squash, juice and pickles through cookery show and prepares record of practicals and flowcharts.
- Learner gets an idea about various methods of packing, storage of processed food materials and also the methods to prevent spoilage during storage through field visit and prepares reports.

## **PLANNING**

In the context of the changing scenario in the field of education, the role of the teacher is not simply to teach the syllabi. The emerging needs of education calls for facilitator's role from teachers. The learning process should be learner centered and activity oriented. Learning activities must enable the learner to develop process domain and multiple intelligence skills to their maximum extent. No matter whether these skills are attained inside or outside the classroom, but the teacher must bear in mind, the fact that they are to be accomplished within a time frame. In order to achieve this end, the teacher may make necessary plans in terms of learning activities, the time required at various stages of learning, the time required for each unit, and also the desired outcome. The plan may be hierarchically structured as:

- a. Annual plan covering the entire activities for the year as a whole
- b. Unit plan which has to be prepared just before the start of a unit. Each chapter is treated as a unit.
- c. Daily plan to provide learning activities for a day's learning.

## YEAR PLAN

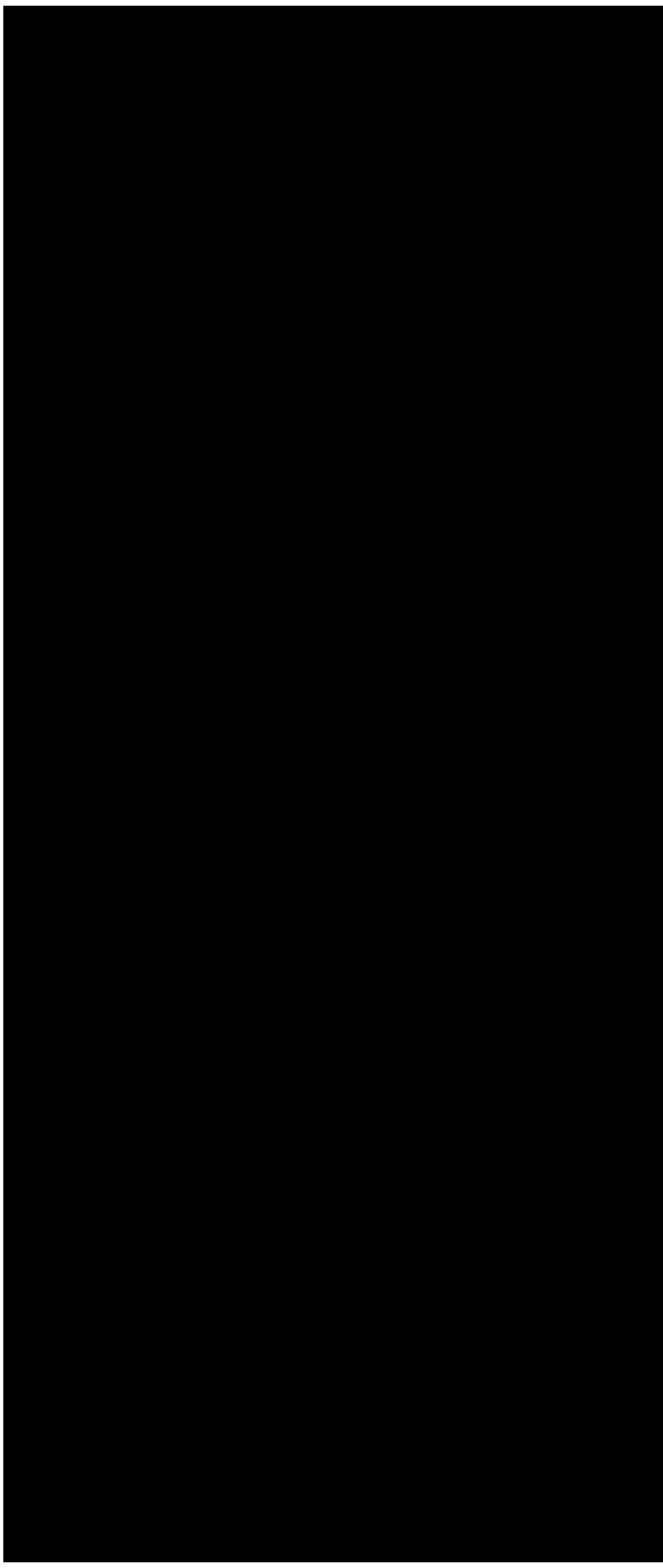
## FRUITS AND VEGETABLES - II YEAR

<b>TERM</b>	<b>UNIT NUMBER</b>	<b>UNIT</b>
I TERM	1	INTRODUCTION TO POMOLOGY
	2	PLANTING SYSTEMS
	3	TREE FRUITS
II TERM	4	OTHER FRUITS
	5	MINOR FRUITS
	6	INTRODUCTION TO OLERICULTURE
	7	TYPES OF VEGETABLE GROWING
	8	SUMMER VEGETABLES
III TERM	9	COOL SEASON VEGETABLES
	10	VEGETABLE SEED PRODUCTION
	11	POST-HARVEST TECHNOLOGY
	12	PRESERVATION OF FRUITS & VEGETABLES
	13	PACKING AND STORAGE

**UNIT PLAN**

**SUBJECT: Fruits and Vegetables**

**UNIT : 1. Introduction To Pomology**



## DAILY PLAN

**CLASS** : II<sup>ND</sup> YEAR

**SUBJECT** : Agriculture (Fruits and vegetable)

**DATE** : .....

**UNIT** : Introduction to Pomology

**TIME** :

### CURRICULUM OBJECTIVE :

Learner defines fruits and Pomology and understands the various types of fruits, their economic, nutritional and medicinal importance through collection & identification, brainstorming and prepares notes.

ACTIVITIES	FEEDBACK																														
<b>Strategy used : Collections &amp; identification, Brainstorming</b>																															
<p>1. The facilitator directs well in advance to bring the specimens of common fruits. Facilitator collects the fruits brought by learners. Divide the learner into 5 groups They identify the fruits. Facilitator supplies photographs of rare fruits. Learners familiarize with the collected fruits and photographs.</p> <p>2. Facilitator initiates brainstorming by asking - What are the fruits you eat daily? -List the nutritional importance of fruits? The facilitator lists out the responses from the learners one by one on the black board. After collecting all responses, the teacher supplements the left out information. The facilitator consolidates the importance of fruits.</p> <p><b>Nutritional Importance</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Nutrient</th> <th style="text-align: center;">-</th> <th style="text-align: left;">Fruit</th> </tr> </thead> <tbody> <tr> <td>Vitamin A</td> <td style="text-align: center;">-</td> <td>Mango</td> </tr> <tr> <td>Vitamin B</td> <td style="text-align: center;">-</td> <td>Orange, Dates</td> </tr> <tr> <td>Vitamin C</td> <td style="text-align: center;">-</td> <td>Guava, Citrus</td> </tr> <tr> <td>Proteins</td> <td style="text-align: center;">-</td> <td>Dates, Jack</td> </tr> <tr> <td>Fat</td> <td style="text-align: center;">-</td> <td>Avocado</td> </tr> </tbody> </table> <p><b>Economic Importance</b> Productivity of fruits is very high</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Banana</td> <td style="text-align: center;">-</td> <td>18.6 t/ha</td> </tr> <tr> <td>Papaya</td> <td style="text-align: center;">-</td> <td>23 t/ha</td> </tr> </tbody> </table> <p><b>Medicinal Importance</b></p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Gooseberry</td> <td style="text-align: center;">-</td> <td>ingredient of Chyavanaprash</td> </tr> <tr> <td>Papaya</td> <td style="text-align: center;">-</td> <td>against stomach problems.</td> </tr> </tbody> </table>	Nutrient	-	Fruit	Vitamin A	-	Mango	Vitamin B	-	Orange, Dates	Vitamin C	-	Guava, Citrus	Proteins	-	Dates, Jack	Fat	-	Avocado	Banana	-	18.6 t/ha	Papaya	-	23 t/ha	Gooseberry	-	ingredient of Chyavanaprash	Papaya	-	against stomach problems.	<p>Active participation of learners. Learners got an idea about the types of fruits and their importance.</p> <p>Learners were actively engaged. Rajesh and Manu listed all the points regarding nutritional importance of fruits.</p>
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### Assigned Work

Prepare Photo album containing pictures of fruits ?

## **EVALUATION**

Evaluation is a systematic process of collecting, analyzing, synthesizing and interpreting evidences of students' progress and achievements both in cognitive and non-cognitive areas of learning. Evaluation has to play significant role in making the learning process more effective. It provides diverse experiences to the learners, keeping in view the skill to be attained continuously by them.

As the curriculum is based on a particular vocation, the selected stream is the most important part and it should be evaluated accordingly. Technical skills, interest and devotion in the field, communication skills, organizational and presentation skills are to be evaluated. Evaluation of the personal and social qualities also should be done. So the evaluation should be continuous and comprehensive.

### **Continuous and comprehensive evaluation (CCE)**

Our traditional evaluation method measures only the memory and recollection capacity of the learner. To eliminate/ overcome this limitation the evaluation should be done on multi dimensional ways by measuring multiple intellectual capacities of the learner. So it is better to evaluate the learner in a continuous and comprehensive manner. CCE helps the learner to understand his own progress and to develop adequate strategies for further improvement.

### **Merits**

- Assess the all round development of the learner on a continuous basis through a variety of activities.
- Effective feed back is possible
- Remedial diagnostic teaching is possible
- Process as well as products is assessed.

### **Components of evaluation**

In order to flourish continuous and comprehensive evaluation we make use of the following components of evaluation.

## 1. Continuous Evaluation (CE)

In the activity based classrom teacher provides variety of experiences through varied tools. Brain storming sessions, group work, discussions, project, seminar, debate field visits, practical works etc., will really flourish joyful learning. By considering the practicability and the nature of the subject, the following tools are advised for continuous evaluation.

A series of learning activities are grouped into five major thrust areas as follows

### 1) Investigative activities

Activities which create a spirit of enquiry, investigation and a mind for research in the learner belong to this group for example.

- Study project
- Case study
- Field study

### 2) Interactive activities

Those activities which improve the communication skill, activities of sharing ideas, etc.

For eg:-

- Seminar
- Panel discussion
- Debate
- Group discussion

### 3) Assigned task

Activities assigned to the learners to enrich/ strengthen the concept and ideas.

For eg:-

- Assignment
- Collections

### 4) Performance task (Tests)

Activities related to the achievements of the learner.

For eg:-

- Class test (oral/ written/ performance test)
- Quiz
- Interview
- Group testing

### 5) Practical based activities

- Preparation of working model
- Album
- Improvisation

From the above five group of activities, the teacher has the freedom to choose any three areas for evaluation purpose. However, the teacher must make sure that the learners should undergo activities related to all the 5 areas during the course of the two years.

### 1. CE Items

#### (1) Study Project

Sl. No	Stages	Criteria	Score
1.	Planning	Relevance of the study Identification of problem Ability to select appropriate tools, ability to select suitable learning method.	4/3/2/1
2.	Data Collection	Ability to collect sufficient and relevant data. Ability to classify and arrange data for analysis. Reliability and authenticity of the data collected.	4/3/2/1
3.	Analysis and Inference	Ability to analyse the data Systematic arrangements. Ability to draw inferences based on analysis. Ability to give suggestions based on inference.	4/3/2/1
4.	Report presentation	Ability to present in logical and sequential order, authenticity of report, time bound completion.	4/3/2/1
5.	Awareness of the Content (Viva)	Knowledge of content and process. Ability to analyse data. Ability to justify inference. Ability to explain. Strategies and methods adopted.	4/3/2/1

Sl. No	Criteria	Score
	<b>(2) Case study</b>	
1.	Identifying the problem	4/3/2/1
2.	Approach to the problem	4/3/2/1
3.	Time bound Action	4/3/2/1
4.	Analysis of the problem	4/3/2/1
5.	Problem solving / Reporting	4/3/2/1
	<b>(3) Field study</b>	
1.	Attitude and readiness towards the task	4/3/2/1
2.	Capacity for Observation	4/3/2/1
3.	Data collection	4/3/2/1
4.	Application of ideas	4/3/2/1
5.	Documentation / Recording	4/3/2/1
	<b>(4) Assignment</b>	
1.	Awareness of the content	4/3/2/1
2.	Comprehensiveness of the content	4/3/2/1
3.	Systematic and sequential arrangement	4/3/2/1
4.	Observation/suggestion/views/judgment/evaluation	4/3/2/1
5.	Evaluation Preparation of note and time bound completion of each stage of work	4/3/2/1
	<b>(5) Seminar</b>	
1.	Planning and Organization	4/3/2/1
2.	Collection and data / content	4/3/2/1
3.	Observation / appraisal and clarity	4/3/2/1
4.	Content knowledge	4/3/2/1
5.	Presentation	4/3/2/1
	<b>(6) Debate, Plant discussion</b>	
1.	Readiness to participate	4/3/2/1
2.	Depth of subject knowledge	4/3/2/1
3.	Communication skill	4/3/2/1
4.	Ability to justify the stand	4/3/2/1
5.	Presentation	4/3/2/1

	<b>(7) Group Discussion</b>	
1.	Readiness to participate	4/3/2/1
2.	Depth of subject knowledge	4/3/2/1
3.	Communication skill	4/3/2/1
4.	Ability to justify in a democratic way	4/3/2/1
5.	Leadership quality	4/3/2/1
	<b>(8) Interview</b>	
1.	Planning	4/3/2/1
2.	Preparation of Questions	4/3/2/1
3.	Communication skill	4/3/2/1
4.	Participation	4/3/2/1
5.	Report preparation	4/3/2/1
	<b>9.Collection</b>	
1.	Collection of materials/Documents	4/3/2/1
2.	Relevance and comprehensiveness	4/3/2/1
3.	Presentation	4/3/2/1
4.	Awareness of the content	4/3/2/1
5.	Time bound progress of work at each stage	4/3/2/1
	<b>10. Quiz</b>	
1.	Preparation of questions	
2.	Relevance of question	
3.	Presentation	
4.	Active participation	
5.	Time management	
	<b>11. Classtest</b>	
	Class test should be oral/ written/	
	Performance.	
	It is to be evaluated on the basis of specific scoring indicators	

### **Terminal or Term End Evaluation (TE)**

It is the written form of evaluation aimed at evaluating the facts, concepts and ideas gained by the learner. The test should not be aimed to evaluate the memory alone. Questions are framed in such a way that the learners are able to apply different mental process while answering. The Terminal Evaluation questions give more emphasis on application, analysis and synthesis level.

The maximum scores for TE is 80 and the minimum is 24 (30%). The questions should be formulated taking into consideration the time required to read, think, understands and write answers. These aspects should be considered while fixing the scores also. To avoid blind guessing, multiple choice and application level questions may be mixed. The total number of questions may vary from time to time. All the questions should be based on the curricular objectives. Open ended questions may be included the choice questions if included also should be based on the same curricular objectives.

### **Practical Evaluation (PE)**

The goal of vocational Education is to generate skills through continuous practices along with investigation and innovations. Continuous and comprehensive practice transforms the unskilled learner to a skilled one. This is the importance and significance of vocational practical.

PE is done to evaluate the practical skills achieved by the learner in the concerned vocational subject Total Scores for PE is 150 and minimum is 60 score i.e. 40%. Practical Examination is conducted for a batch of 8 learners having 6 hours duration.

Practical evaluation should be done taking into account the whole practical included in the curriculum since Learning of practical skills is a continuous process through out the period of study.

### **Distribution of scores for practical evaluation**

<b>Practical Evaluation components</b>	<b>Score</b>	<b>Percentage</b>
Demonstration	37.5	25
Viva	15	10
Diagnosis/situation analysis	30	20
Identification	30	20
Calculation	22.5	15
Record	15	10
<b>Total</b>	<b>150</b>	<b>100</b>

### Indicators for vocational practical evaluation

■ Demonstration		Total Score: 37.5
- Method - write up/procedure	15	
- Technique	15	
- Perfection/neatness	7.5	
Total	37.5	
■ Viva		Total Score: 15
■ Diagnosis/situation analysis		Total Score: 30
- Identification problem	5	
- Analysis	5	
- Interpretation/inference/remedy	15	
- Reporting	5	
Total	30	
■ Identification		Total Score: 30
- Tools/implments/instruments		
- Specimen		
- Breeds/variety		
■ Calculation		Total Score: 22.5
- Fertilizer		
- Pesticide		
- Productivity		
■ Records		Total Score: 15

### Vocational Competency Evaluation (VCE)

Vocational Competency Evaluation is to evaluate the vocational skill and aptitude developed by the students during the learning process. This is a system to judiciously evaluate the required value addition and consequent capacity building in the concerned vocational curriculum. The vocational education is aimed at developing interest, skills and devotion in specific vocational fields. As other evaluation components like, CE, PE and TE cannot assess the vocational competency and professional skills, acquired by the students an internship evaluation (IE) component has been introduced to meet this requirement.

Internship evaluation should be done based on the following components like regularity and punctuality, value addition and capacity building.

### 1. Regularity and punctuality

Regularity and punctuality has vital role in vocational education learning continuous process, the regular presence of the Learner is must for attaining maximum efficiency.

### 2. Value Addition

Value addition is the qualitative measure of the learner's interest, devotion perseverance and efficiency. Value addition can be evaluated through conducting field visits/ vocational survey. The experiences gained through field visit / vocational survey increases the level of intrinsic motivation and positive attitude towards the vocational field and thereby increase his value as a semi-professional.

### 3. Capacity Building

It gives a quantitative measure of the student's skill in graded area exposure. Capacity building can be evaluated through conducting the following activities.

1. OJT / Simulated experiment
2. Performance – camp/exhibition/clinic
3. Performance – Production/Service cum Training centre. (PTC)

These components help the learner to practice the acquired skills in the real situation and thereby increasing self-confidence and promoting self-reliance.

### Vocational Competency Evaluation Indicators

No	Items	Scores
1.	Regularity and punctuality	10
2.	Field visit / vocational project survey (anyone)	20
3.	OJT / Simulated experiment performance - Camp / exhibition / clinic. Performance - PTC (anyone) / Practical skills	20
	<b>Total</b>	<b>50</b>

1. Regularity and punctuality of the learner can be assessed by using attendance and time bound completion of tasks. It is evaluated by using 5 point grading system.

**Rating Scale**

Sl.No	Items	1	2	3	4	5
1.	Regularity	Never regular	After regular	Equally regular	Most of the time regular	Always regular
2.	Punctuality	Never Punctual	Often Punctual	Usually Punctual	Most of the time punctual	Always punctual

Item	Evaluation indicators	Scores	Score
<b>Regularity and punctuality</b>			<b>10</b>
<b>Value addition</b>	<p><b>Field visit</b></p> <p>1. Attitude and readiness towards the task</p> <p>2. Capacity for observation</p> <p>3. Data collection</p> <p>4. Application of ideas</p> <p>5. Documentation/recording</p> <p style="text-align: center;">Or</p> <p><b>Survey</b></p> <p>1. Planning</p> <p>2. Data collection</p> <p>3. Consolidation of data and analysis</p> <p>4. Drawing inference</p> <p>5. Reporting</p>	<p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p>	<b>20</b>
<b>Capacity Building</b>	<p><b>OJT/Simulated experiment</b></p> <p>1. Involvement/participation</p> <p>2. Skills in doing work /communication skills</p> <p>3. Time bound action</p> <p>4. Capacity for observation, analysis and innovation</p> <p>5. Documentation, recording and display</p>	<p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p>	

	Or		
	<b>Performance in camp/exhibition/clinic</b>		<b>20</b>
	1. Ability for planning and organizing	4/3/2/1	
	2. Mastery of subject	4/3/2/1	
	3. Ability for communication	4/3/2/1	
	4. Innovation	4/3/2/1	
	5. Involvement/social commitment	4/3/2/1	
	Or		
	<b>Performance in production/ service cum training center (PTC)</b>		
	1. Mastery of vocational skills	4/3/2/1	
	2. Managerial capacity	4/3/2/1	
	3. Promoting self confidence	4/3/2/1	
	4. Innovation approach	4/3/2/1	
	5. Promoting self reliance	4/3/2/1	

## GRADING

Continuous Evaluation is essential for activity based learning process. But the skills achieved by the students cannot be completely measured in terms of marking system. Marking system proved unscientific in evaluating the growth and development of individual students both in cognitive and non-cognitive areas. Classification of students in terms of marks were both unjust and indefensible. It also creates mental stress and strain among the students. To overcome this limitation, a popular mode of evaluating students' performance known as grading system has been evolved. It is quite extensively used all over the world. At the Vocational Higher Secondary stage, it is desirable to use a 9 point scale absolute grading to co-ordinate and record the evaluation. After giving the score, they are changed into percentages and appropriate letter grades are awarded corresponding to each percentage. This system is termed as absolute grading.

The score percentage and corresponding letter grade is given below:

<b>Score in percentage</b>	<b>Grade</b>
90-100	A+
80-89	A
70-79	B+
60-69	B
50-59	C+
40-49	C
30-39	D+
20-29	D
Below 20	E

**UNIT -I**  
**INTRODUCTION TO POMOLOGY**

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# UNIT -I

## INTRODUCTION TO POMOLOGY

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### INTRODUCTION

Fruits are called protective food, as they are rich in vitamins and minerals. The technique of fruit culture and fruit utilization receives the attention of man at a very early stage. The country is bestowed with a great variety of soil and climatic conditions in which a large variety of fruits can be cultivated. The fruits have the capacity for improving returns per unit area, uplifting the rural economy, earning foreign exchange through export and generating large employment opportunities in the rural sector.

In this chapter efforts have been made to know what fruits are, their economic, nutritional and medicinal importance, area and production, factors affecting fruit production, important problems in fruit production and classification of fruits.

This chapter aims to bring the learner closer to the activity of classifying the fruits, listing state wise and country wise area and production and identifying the important problems in fruit production.

### CURRICULUM OBJECTIVE –1

Learner defines fruits and pomology and understands the various types of fruits, their economic, nutritional and medicinal importance through collection and identification, brainstorming and prepares discussion notes.

### SYLLABUS

Definition of fruits and pomology – various types of fruits – botanical and horticultural fruits – economic, nutritional and medicinal value of fruits.

### LEARNING EXPERIENCE

#### (i) Collection & Identification

**Materials:** Photographs, specimens of fruits

Note to the facilitator:

Facilitator should direct well in advance to bring the specimens of common fruits.

The fruits are collected, learners are grouped and asked to identify the fruits. Then the facilitator supplies photographs of rare fruits.

**(ii) Brain storming**

The facilitator creates a situation for brainstorming. She initiates the brain storming by asking simple questions like:-

- What are the fruits that you eat daily?
- List the nutritional importance of fruits?
- Suggest a fruit used against eye problems?

Through these questions, the facilitator exploits the learner's knowledge. She lists out the responses in black board and discusses the left out points.

## CONSOLIDATION

- Botanically, a fruit is the developed ovary of a flower .
- Pomology is the study of fruit plants.
- Nutritive and medicinal importance of fruits

Fruits are called protective food as they are rich in vitamins and minerals.

### Nutrients and sources

#### 1. Calories and proteins

Sapota, banana, avocado, dates, custard apple and others

#### 2. Vitamin A

Gooseberry, mango, papaya, passion fruit, plum, and others

#### 3. Vitamin B

Cashewnut, almond, Banana, dates, pomegranate and others.

#### 4. Vitamin C

West Indian cherry, aonla, guava, citrus, pineapple

#### 5. Calcium

Lemon, custard apple, almond

#### 6. Iron

Karonda, guava, grape, dates

### Consequences of deficiency

Retarded growth, retarded mental development, irritation, discoloration of skin and hair, swelling of face and lower body parts.

Night blindness, sensitivity to bright light, softening of cornea and eventual blindness.

Beriberi and loss of appetite, cracks on corners of mouth, sore tongue, ulcers in the oral cavity.

Scurvy, bleeding gums, susceptibility to common cold.

Important for formation of bones, teeth and blood clotting.

Anaemia, spoon shaped nails, frequent exhaustion.

- Economic importance of fruits
  - Per hectare yield and returns is more than field crops.
  - Generate more employment opportunities
  - Offer best use of waste lands.
  - Can be grown as home garden crops.
  - Helps to earn more foreign exchange.
  - Fruit production provides raw materials for processing industries.

## **PRODUCT**

List of identified fruits, discussion notes.

## **EVALUATION**

1. Fruits are called protective foods. Comment.
2. Fruits are of great medicinal value-Substantiate the statement.
3. Match the following

Vitamin A        -    Scurvy                        -    Mango

Vitamin B        -    Night Blindness        -    Dates

Vitamin C        -    Anemia                        -    Banana

Iron                -    Beri Beri                        -    Citrus

## **REFERENCE**

Phalavrikshangal - G.S. Unnikrishnan - Bhasha Institute.

Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath

Text book on Pomology Vol. I T.K.Chattopadhyay.

## **CURRICULUM OBJECTIVE – 2**

The learner understands the present status of area and production of fruit trees country wise and state wise, the factors affecting fruit production, problems and measures to overcome through assignments, discussion and prepares reports and discussion notes.

## **SYLLUBUS**

Area and production of major fruits in the country and state - important factors affecting fruit production - important problems in fruit production and measures to overcome.

## LEARNING EXPERIENCE

### a) Assignment

Materials: Farm Guide, Survey of India , relevant periodicals like Karshakasree and Reference books.

Facilitator suggests certain reference materials like Farm Guide, Survey of India and some relevant periodicals. Now the learners are asked to collect data about area and production of different fruit trees by referencing the above materials. Each learner prepares assignments.

### b) Discussion

Facilitator divides the learners into groups. He leads the discussion by asking questions like

- What are the common problems noticed in fruit trees in your locality ?
- What are the remedial measures you suggest to overcome the problems ?

Each group discusses the points and presents this in the whole class. The facilitator should supplement the missed information.

## CONSOLIDATION

- State wise and country wise area and production
- Factors affecting fruit production
  - Climate
  - Soil
  - Locality
  - Irrigation
  - Availability of labour
- Problems affecting fruit production
  - Low productivity
  - Lack of good planting materials
  - Poor management
  - Huge post harvest losses
  - Lack of organized market

- Lack of storage facility
- Measures to overcome the problems
  - Introducing new varieties
  - Expansion of area under cultivation
  - Following improved cultivation practices
  - Improving existing orchards.
  - Intercropping and mixed cropping
  - Proper post harvest management
  - Introducing storage and market facilities.
  -

## **PRODUCT**

Assignment reports, Discussion notes

## **EVALUATION**

1. Production of fruits is inadequate to meet the domestic needs of Kerala. Justify the reasons and suggest remedy ?
2. Imagine you are an Agricultural Officer. What would you suggest to improve the productivity of fruits in your panchayat ?

## **REFERENCE**

Farm Guide - FIB

Survey of India - The Hindu

Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath

Text book on Pomology Vol. I T.K.Chattopadhyay

## **CURRICULUM OBJECTIVE - 3**

Learner gets an idea about the classification of fruits based on climatic requirements through brainstorming and discussion and prepares notes.

## **SYLLABUS**

Classification of fruits based on climatic requirements

## LEARNING EXPERIENCE

### Brainstorming

Facilitator evolves the format of classification of fruits according to climate by asking questions like

- List out the common fruits grown in your area ?
- What are the specific features of your climate ?
- Name some fruits grown in cool areas ?

The facilitator lists out the responses of learners in the blackboard. She classifies fruits based on climate. Then the facilitator discusses all the aspects regarding classification of fruits.

## CONSOLIDATION

### Fruits are classified mainly into three

- ◆ Tropical Fruits
  - ◆ Evergreen trees
  - ◆ Temperature 25-35°C
  - ◆ Latitude 23°N and 23°S latitude
  - Eg: Mango, Jack, Sapota, banana
- ◆ Sub-tropical Fruits
  - ◆ Evergreen or deciduous trees
  - ◆ Temperature 13-18°C
  - ◆ Latitude 23°-30°N and 23°-30°S latitude
  - Eg: Citrus, Grapes
- ◆ Temperate Fruits
  - ◆ Deciduous trees
  - ◆ Temperature 7-11°C
  - ◆ Latitude 30°-60°N and 30°-60°S latitude
  - Eg: Pear, Peach, Apple

## **PRODUCT**

Discussion notes

## **EVALUATION**

1. Fruits like apple, peach, plum etc. cannot be raised as our commonly grown fruits like banana and mango. Suggest suitable reasons ?

## **REFERENCE**

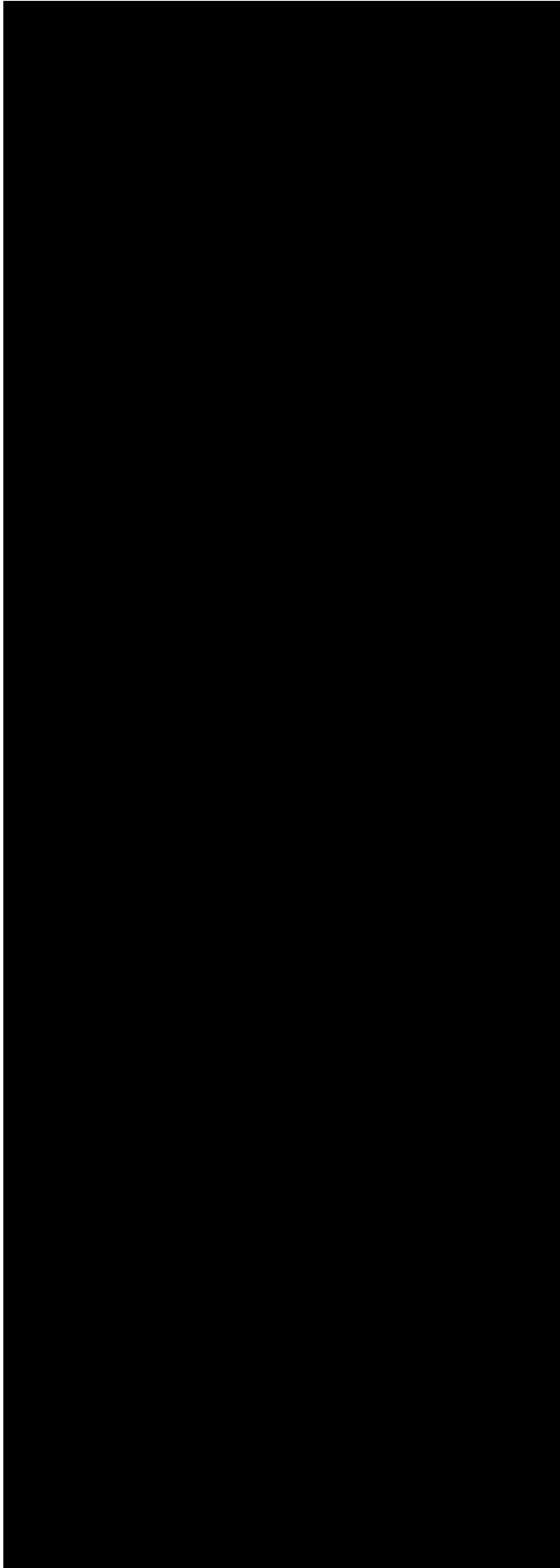
Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath

Fruits - Ranjiit Singh

Text book on Pomology Vol. I T.K.Chattopadhyay.

**UNIT -2**

**PLANNING SYSTEM**



## **UNIT -2**

# **PLANTING SYSTEMS**

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### **INTRODUCTION**

For proper layout of the orchard, the system of planting and planting distance are considered important. The systems of layout refer to the orderly way of planting the trees, which helps to carry put intercultural operations. The lay out is to be decided after considering the topography of the land and growth habits of the plants.

This unit aims to give awareness about the systems of planting, layout of an orchard, principles and practices of growing fruit trees. The learner experiences the actual process of layout of an orchard with a scientific and technical outlook.

### **CURRICULUM OBJECTIVE –1**

The learner understands the different systems of plantings, its advantages and disadvantages through field trip, discussion and demonstration and prepares notes and reports.

### **SYLLABUS**

Different systems of layout – square system, rectangular system, quincunx system, hexagonal system, triangular system, contour system, hedge system – advantages and disadvantages.

### **LEARNING EXPERIENCE**

#### **a) Field trip and discussion**

The facilitator orients the learners with different systems of planting

Location : Any nearby field

Observation to be recorded :

1. Crops present in the field
2. Topography of the land
3. Growth habit of the crop

#### 4. Planting distance

The learners are asked to collect information individually. They collect data, prepare notes after observation and discussion with farmers. After briefing of notes, prepared by the learners in the classroom, the facilitator explains different systems of planting along with their advantages and disadvantages.

#### **b) Demonstration**

Materials: Rope, pegs, planting materials

The facilitator divides the learners into four groups. Each group has to demonstrate the different systems of planting. Based on the information gathered from field trip, the learner becomes confident in the selection of the most appropriate system of planting.

### **CONSOLIDATION**

The different systems of planting are

#### **1. Square system**

- Trees are planted at the corners of a square.
- Plant to plant and row to row distance are equal.

Advantages

- Simplest system of layout
- Intercultural operations easy
- Facilitates better supervision.

Disadvantages

- Accommodate only less number of plants.
- Less efficient utilization of land.

#### **2. Rectangular system**

- Trees are planted at the corners of a rectangle.
- Plant to plant and row to row distance not equal.
- 

Advantages & Disadvantages

- Same as square system.

### 3. Quincunx system/Filler system

- Trees are planted at the corners of a square with a filler tree at the center.

#### Advantages

- Number of trees double than that of square system.
- Filler plants give earlier and additional income

#### Disadvantages

- The distance between trees are reduced.

### 4. Hexagonal system

- Trees are planted at the corners of an equilateral triangle.
- Six trees form a hexagon with a tree at the center.

#### Advantages

- 15 % more trees can be accommodated than square system.

### 5. Contour system

- Followed only in areas of undulating topography.
- Land is divided into a number of terraces along the contour.

### 6. Hedge system

- Planting is done in rows.
- Two methods – single hedge system and double hedge system

## PRODUCT

Field diary, Notes with diagrams, reports.

## EVALUATION

1. Suppose a farmer is having 50 cents of land in undulating terrain. He wishes to plan a fruit crop in his area. What measures will you take to select a suitable crop and an appropriate planting system ?

## REFERENCE

Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath

Fruits - Ranjiit Singh

Text book on Pomology Vol. I T.K.Chattopadhyay

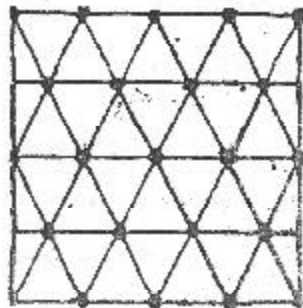
### Systems of Planting



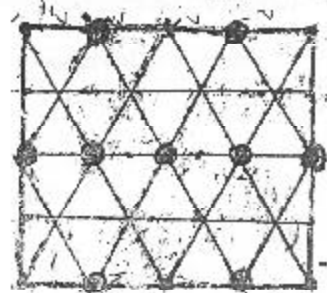
SQUARE

RECTANGULAR

QUINCUNX



TRIANGULAR



HEXAGONAL



CUNTOUR

**CURRICULUM OBJECTIVE –2**

Learner gets an idea about the layout plan of an orchard, principles and practices of growing tree planting through discussion and method demonstration by preparing notes with diagrams.

**SYLLABUS**

Layout plan of an orchard – Principles and practices of tree planting

**LEARNING EXPERIENCE****a) Discussion and Method demonstration**

Materials Rope, peg, planting materials

The facilitator explains the different steps involved in the lay out of an orchard with the help of diagrams.

The layout prepared in the previous activity can be made use of. The facilitator divides the learners into 5 groups. Each group demonstrates the layout plan of orchard step by step.

**CONSOLIDATION**

- Steps involved in the layout of an orchard
  1. Forming base line
  2. Taking perpendicular lines
  3. Peg marking
  4. Extension of lines and completion of peg marking
  5. Final correction
- Principles to be followed while planning an orchard
  - The orchard should present a beautiful view from the main entrance.
  - Evergreen fruit trees should be planted in front and deciduous plants at the rear.
  - The shorter trees may be assigned space in the front and shorter ones in the rear part of the garden
  - Buildings like owner's residence, sheds, quarters etc. should be located near the road and at the center of the orchard.
  - Roads should be straight and occupy minimum space.

- A well should be dug at the highest point preferably, before planting the orchard
- Fruit trees requiring frequent irrigation should be located close to the irrigation source.
- Fruit trees ripening at the same time should be located in adjoining plots.
- Fruits that attract birds and animal pests are to be located near watchman's shed.
- The system of planting to be adopted should be decided before the layout of the orchard.
- Provision should be made for windbreaks around the orchard.
- Fencing of the orchard should be done ahead of planting.

## **PRODUCT**

Discussion notes, Layout plan (Group plan)

## **EVALUATION**

1. Suppose a farmer wishes to cultivate pineapple, banana and mango in an area of 50 cents. Give him necessary directions regarding the planning and layout of the orchard.

## **REFERENCE**

Fundamentals of fruit production – Dr.A.K.Dhote

Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath

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**UNIT -3**  
**TREE CROPS**

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## **UNIT -3**

# **TREE FRUITS**

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### **INTRODUCTION**

Fources and yields higher returns per unit area. It also enhances land value and enables better purchasing power for those who are engaged in this industry. Therefore fruit production is a very important vocation for the health, wealth, hygiene and happiness of any nation.

In Kerala, a diversified cropping system is followed at present. The production of these crops must be increased in order to meet the demand of increasing population. For increasing production, we have to use modern technologies in the field of agriculture.

This chapter includes various scientific cultovation practices which could be adopted to improve the growth and yield of tree fruit crops. Our aim is to impart knowledge regarding modern cultivation practices to the farmers of our state to improve production.

This chapter aims to bring the learner closer to real life activity of experiencing and observing the actual process of crop production, with a scientific and technical outlook.

### **CURRICULUM OBJECTIVE**

Learner gets experience in the cultivation practices of major fruit crops of Kerala like Mango, Jack, Sapota, guava, citrus and cashew through brainstorming, group discussion, interview and prepares discussion notes and reports.

### **SYLLABUS**

Cultivation practices of tree fruits like mango, jack, Sapota, guava, citrus and cashew-varieties, climate and soil – propagation - progeny orchard – planting - manures and fertilizers - intercultural operations - problems - plant protection - harvesting-storage.

### **LEARNING EXPERIENCE**

#### **a) Brainstorming**

The facilitator asks the following questions –

- Which are the important tree crops in your locality ?

- Can you identify the varieties ?
- How planting is done ?
- Whether fertilizers and manures are applied or not ?
- Whether plant protection practices are followed ?

By this the learner gets a general idea about the activities followed by a farmer for raising fruit trees.

### **b) Group Discussion**

The facilitator divides the learners into six groups. She names the groups as - mango, jack, sapota, guava, citrus and cashew. Each group discusses the various cultivation aspects of the concerned crops. Each group leader presents the discussion notes. The facilitator supplements missed information.

### **c) Interview**

#### **Preparation of interview schedule**

The facilitator divides learners into six groups. Each group is directed to prepare an interview schedule. Refine the schedule through a whole class discussion. A model can be like this :

<b>Cultural</b>	<b>Operations</b>	<b>Mango</b>	<b>Jack</b>	<b>Sapota</b>	<b>Guava</b>	<b>Citrus</b>	<b>Cashew</b>
Variety							
Planting							
Manuring							
Irrigation							
Plantprotection							
Harvesting							
Storage							

Groups can interview farmers. They fill up the interview schedule properly. Ensure to collect all relevant and sufficient information. After the interview, each group can consolidate the data through discussion. The each learner should prepare an interview report.

## CONSOLIDATION

- ❖ Cultivation practices of major fruit trees like mango, jack, Sapota, guava, citrus and cashew
  - Soil and Climate
  - Varieties
  - Method of propagation
  - Planting
  - Manuring
  - Intercultural operations
  - Plant protection measures
  - Harvesting and Storage

### Important varieties of major fruit crops

Fruit crops	Varities
Mango	Alphonso, Kalappady, Neelum, Mundappa, Banesan, Mulgoa, Suvarnarekha, Sindhu, Amrapally, Mallika
Jack	Ceylon Jack, Muttom Varika, Burliar-1, Rudrakshi, PLR-1
Sapota	Cricket ball, Oval, Kalippatti, Keerthi barthi, Culcatta round, CO-1, CO-2
Guava	Allahabad Safeda, Lucknow-49, Hafsi, Chittidar, Pear shaped, Red fleshed, Apple coloured
Citrus Sweet Orange	Musambi, Sathgudi, Blood red, Malta, Washington navel, Valencia
Mandarins	Coorg, Nagpur, Khasi
Lime	Kagzi
Cashew	Anakkayam –1, Madakkathara –1, Kanaka, Dhana, Sulabha, Dharasree, Raghav, Mridula, Vridhachalam- 3, Amrutha, Anakha

## PRODUCT

Discussion notes, Report of interview

## **EVALUATION**

1. Members of a residential colony wish to cultivate an orchard. Give them necessary instructions ?
2. A mango tree in your home which was yielding regularly (more than 1500 fruits/year) in previous year gives poor yield (only 500 fruits) in the present year. Suggest the reasons and remedial measure?

## **REFERENCE**

Package of Practices Recommendation - KAU

Fruits – Ranjit Singh

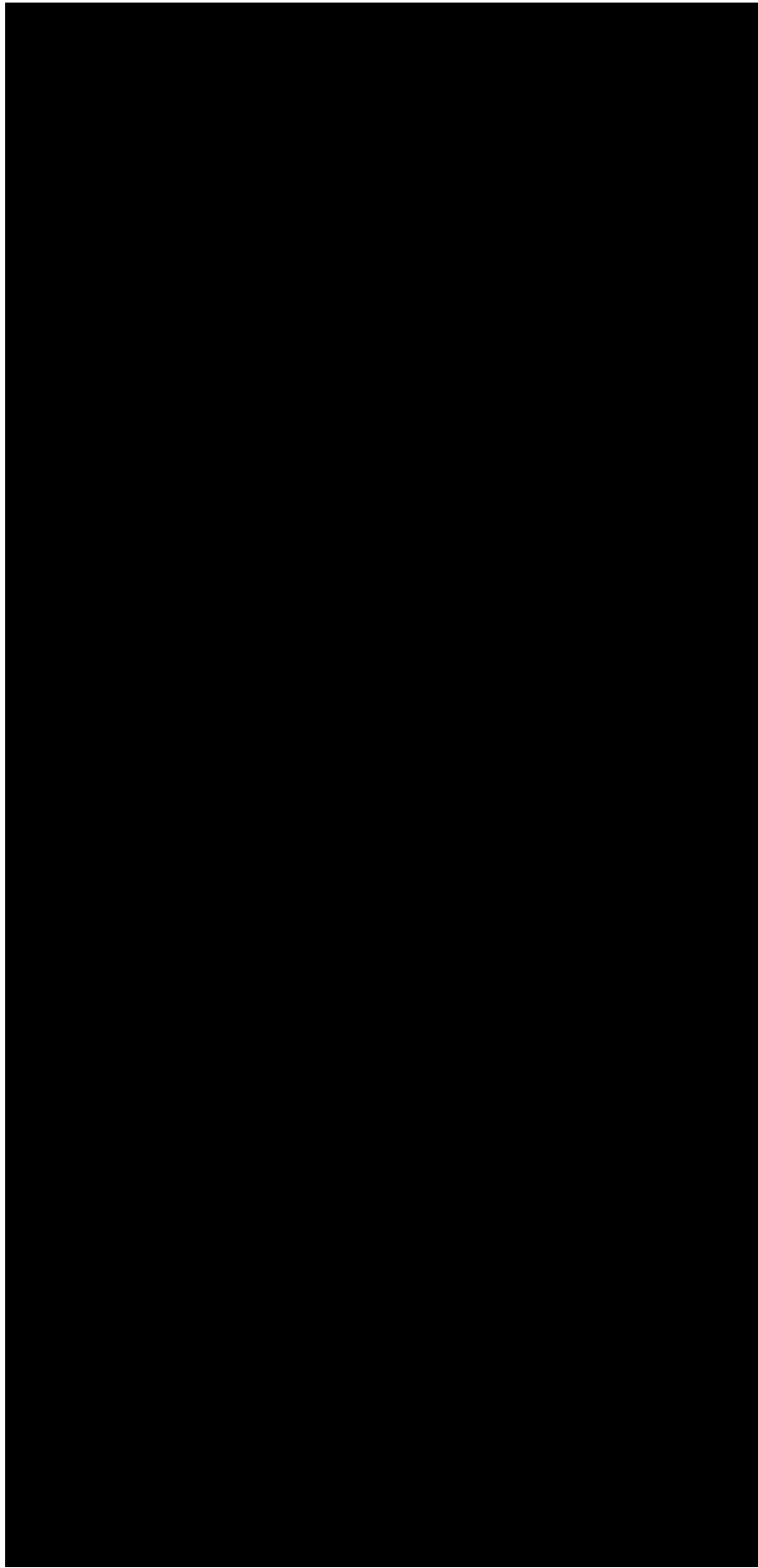
Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath

PhalavrIkshangal - G.S. Unnikrishnan - Bhasha Institute.

**UNIT-4**  
**OTHER FRUITS**

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# **UNIT-4**

## **OTHER FRUITS**

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### **INTRODUCTION**

Fruits form a complete wholesome food for the grownups, still growing and invalids leading to healthy body and mind. It is a ready source of energy with a unique capacity to guard against many deficiency diseases. Fruits can supply more than 1/3<sup>rd</sup> of the requirement of the calories, vitamins and minerals to the mankind.

### **CURRICULUM OBJECTIVE –1**

Learner understands the cultivation practices of important fruits like banana, pineapple and papaya through collection of secondary sources, discussion and demonstration and preparing notes.

### **SYLLABUS**

Cultivation practices of important fruit crops like banana, pineapple and papaya-varieties, climate and soil – different methods of propagation – curing procedure of planting materials – method of planting - manures and fertilizers - intercultural operations - plant protection measures- harvest.

### **LEARNING EXPERIENCE**

#### **a) Data collection from secondary source**

The facilitator asks the learners to collect recent periodicals in which the cultivation aspects of banana, pineapple and papaya are published. Learner prepares brief notes. He discusses the relevant points in the class. The teacher supplements missed information regarding cultivation aspects.

#### **b) Demonstration**

Divide the learners into 3 groups. Supply one crop to each group. The learners are asked to demonstrate the scientific cultivation practices of these crops.

## CONSOLIDATION

- ❖ Cultivation practices of fruit crops like banana, pineapple and papaya
  - Soil and Climate
  - Varieties
  - Method of propagation
  - Curing of planting materials
  - Method of planting
  - Manuring
  - Intercultural operations
  - Plant protection measures
  - Harvesting

### Important varieties of fruits

Fruits crops	Varieties
Banana	
Nendran	Nedu nendran, Zanzibar, Chengalikodan
Table varieties	Palayankodan, Chenkadali, Robusta, Njalipoovan, Koopillakannan, Karpooravalli, Dwarf cavandish, Dudhsagar, Gros michael, BRS-1,2
Culinary varieties	Monthan, Batheesa, Kanchikela, Nendrapadathy
High ranges	Boldles Altafort, Virupakshi
<b>Pineapple</b>	Kew, Mauritius, Amulya, Queen
<b>Papaya</b>	Solo, Honeydew, Washington, Pusa giant, Pusa nanha

## PRODUCT

Discussion notes, notes prepared through referencing the secondary sources.

## EVALUATION

1. Suppose a farmer wishes to cultivate Kew variety of pineapple and Nendran variety of banana together in an area of 10 cents. Help him to raise a successful crop ?

2. Match the following

Papaya	-	Amulya
Pineapple	-	BRS-1
Banana	-	Washington

## REFERENCE

Package of Practices Recommendation - KAU Directorate of Education

Fruits – Ranjit Singh

Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath

## CURRICULUM OBJECTIVE - 2

Learner develops an idea about the use of growth regulators in pineapple and papain extraction through field visit, method demonstration and discussion and preparing notes.

## SYLLABUS

Use of growth regulators – Method of papain extraction

## LEARNING EXPERIENCE

### Field visit, method demonstration and discussion

**Materials** Growth regulator, sprayer, knife, glass vessels, Potassium metabisulphite

Facilitator arranges a field visit to demonstrate the use of growth regulators and the method of papain extraction. Each learner gets an opportunity to familiarize the two methods under field situations. The learner further observes the changes that take place after the use of growth regulator in the same field.

The facilitator then discusses all the aspects regarding the growth regulators and papain extraction.

## CONSOLIDATION

### Induction of flowering in pineapple

For inducement of uniform flowering, apply 25 ppm ethephon ( 2- chloro ethyl phosphonic acid) in aqueous solution containing 2 % urea and 0.04 % calcium carbonate as follows :

- The mixture (50 ml/plant) is to be applied pouring into the heart of 16-17 month old plants (39-42 leaf stage) during dry weather.

- For treating 1000 plants, 50 litres of the solution would be required.
- Ingredients for preparing 50 litres of aqueous solution are :

Ethephon	-	1.25 ml	 — made upto 50 litres with water
Urea	-	1 kg	
Calcium carbonate	-	20 g	

### **Extraction of Papain**

Papain is an active enzyme in the latex or milky secretion of papaya plants and immature fruits. Half to three-fourth matured fruits (about 70-100 days from fruit set) are preferred for Papain extraction. Tapping of fruits can be done early in the morning by giving longitudinal skin-depth incisions (0.3 cm) on the surface of fruits from the stalk end to tip. Stainless steel blades/knives or bamboo splinters are used for incising papaya fruits. The milky latex is collected in arecanut spathes or aluminium or glass vessels. The incisions are repeated in 2 or 3 subsequent occasions at 3 to 4 days interval. The latex collected in this way is dried in the sun or in an artificial drier at 50-55°C. A small quantity of potassium metabisulphite is added to the liquid latex to extend the storage life of Papain. The dried latex can be stored in airtight polythene or glass containers for a period of six months. Tapped papaya fruits are equally tasty as untapped ones even though impaired in appearance.

Varieties for Papain extraction - CO-2, CO-5

### **PRODUCT**

Discussion notes

### **EVALUATION**

1. Suppose you are having pineapple cultivation. You would like to harvest the whole crop at the same time. What measures will you take ?

### **REFERENCE**

Package of Practices Recommendation - KAU

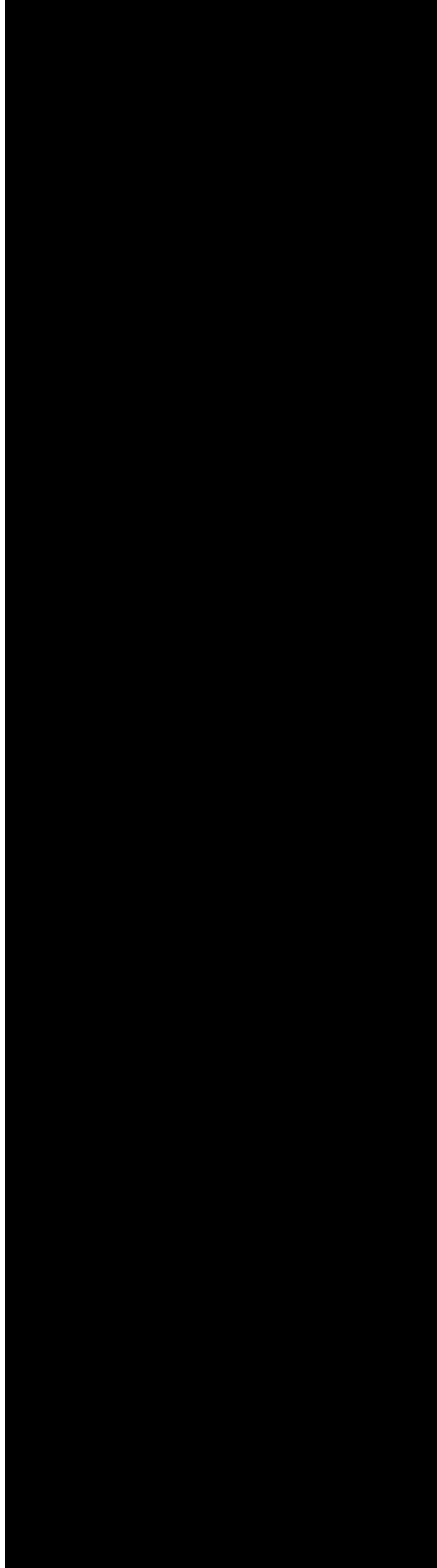
Fruits – Ranjit Singh

Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath.

**UNIT-5**  
**MINOR FRUITS**

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## **UNIT-5**

# **MINOR FRUITS**

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### **INTRODUCTION**

Kerala is rich in bio-diversity especially in the case of fruit plants. But we are cultivating only a few crops commercially. There are many other fruit crops that are categorized as minor fruits. Many of these are rich in nutrients and have medicinal qualities. Some of these have commercial prospects. The cultivation and utilization of these fruits should be improved.

### **CURRICULUM OBJECTIVE**

Learner identifies the minor fruits and their places of growing – Grapes, Mangosteen, Litchi, Avocado, Pomegranate, Citrus fruits, Apple, Pear, Peach, Plum, Cherry, Roseapple, Bilimbi, Starfruit, West Indian Cherry, Egg fruit, Lovi-lovi, Annona, Caronda etc. through identification, collection and discussion and prepares notes.

### **SYLLABUS**

Importance of minor fruits – Common names of minor fruits and their places of growing.

### **LEARNING EXPERIENCE**

#### **1. Collection and Discussion**

**Materials** Specimens of minor fruits, Photographs of rare fruits.

The facilitator asks the learner well in advance to collect common minor fruits. Learner collects the minor fruits from his locality. Facilitator provides the learners with the photographs of rare minor fruits. The learners identify the fruits and facilitator opens a discussion regarding the minor fruits and their importance.

### **CONSOLIDATION**

- Common minor fruits like Grapes, Mangosteen, Litchi, Avocado, Pomegranate, etc
- Places of growing

- Importance of minor fruits.

### **PRODUCT**

Charts showing places of growing minor fruits.

### **EVALUATION**

List out 5 minor fruits grown in your homesteads?

### **REFERENCE**

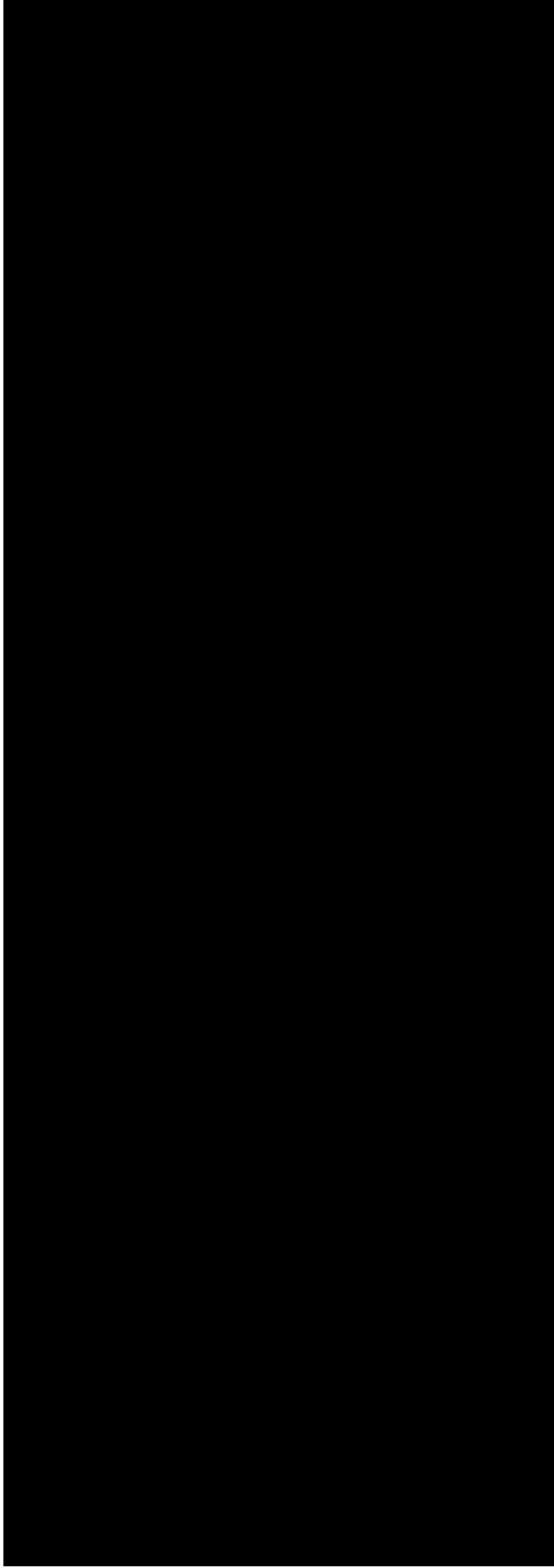
Fruits – Ranjit Singh

Fruit production - A.A. Farooqi, J.V Narayana Gowda, M.M Khan, U.V Sulladmath

**UNIT 6**  
**INTRODUCTION TO OLERICULTURE**

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## **UNIT 6**

# **INTRODUCTION TO OLERICULTURE**

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### **INTRODUCTION**

Vegetables play a vital role in balancing human diet being nutritious and protective. It is highly essential to take vitamins and minerals in required quantities for sound health of human body to create resistance against diseases. Vegetables have become an integral part of the daily diet of all classes of society. Vegetables are rich sources of vitamins and minerals besides having medicinal values. Indian Council of Medical Research recommends that an adult should consume about 300 gms of vegetables daily. The per capita consumption is very low (about 120 gm) as compared to the most advanced countries. India prides itself as the second largest producer of vegetables in the world.

Our aim is to impart knowledge about modern cultivation practices of vegetables to the farmers of our state in order to improve production. This unit enables the learner to get an idea about the importance of vegetable cultivation and various types of vegetable production. Apart from this he is expected to exhibit a life style of consuming vegetables.

### **CURRICULUM OBJECTIVE -1**

Learner defines vegetable, olericulture and understands the economic, nutritive and medicinal importance of vegetables through brainstorming and discussion and prepares discussion notes.

### **SYLLABUS**

Definition of vegetables and olericulture – Scope and importance of vegetable crops – economic, nutritive and medicinal importance.

### **LEARNING EXPERIENCE**

#### **a) Brainstorming and Discussion**

The facilitator initiates the discussion by asking questions like

- List out the vegetables in your home ?
- Which food do you prefer- vegetarian or non-vegetarian?

- What are the disadvantages of taking only non-vegetarian food ?
- Can you suggest a few advantages of vegetarian food ?

The facilitator presents the responses of learners in a blackboard. The she supplements additional information. The facilitator should ensure that all students recorded the relevant information in their vocational diary.

## CONSOLIDATION

- Olericulture is the branch of horticulture that deals with the study of vegetables.
- Nutritive and medicinal importance of vegetables

Vegetables are called protective foods as they are rich in vitamins and minerals.

Nutrients and source	Consequences of deficiency
<b>1. Vitamin A</b>	
Carrot, peas, tomato, green chilly, cabbage, sweet potato	Xerophthalmia, Night blindness, sore eyes, susceptibility to respiratory and digestive tract infections, rough skin in children.
<b>2. Vitamin B</b>	
Green leaves, cabbage, lettuce, carrot, onion	Beriberi and loss of appetite, cracks on corners of mouth, loss of weight, ulcers in the oral cavity.
<b>3. Vitamin C</b>	
Cabbage, lettuce, tomato, chilly, other green vegetables	Scurvy, bleeding gums, rheumatism, damage to heart muscles, susceptibility to diseases.
<b>4. Vitamin D</b>	
Green vegetables	Rickets
<b>5. Vitamin E</b>	
Leafy vegetables, vegetable oils	Sterility
<b>5. Calcium</b>	
Beans, Cabbage, carrot, onion, peas,beans	Rickets, osteomalacia, pigeon chest, retarded growth.
<b>6. Iron</b>	
Cabbage, peas, beans, tomato	Anemia, spoon shaped nails, frequent exhaustion.

- Economic importance of vegetables
  - i. Vegetables are quick growing and yield immediate returns to growers
  - ii. Vegetables can be grown through out the year
  - iii. Per acre yield is very high
  - iv. Vegetables are important source of farm income.

**PRODUCT****Discussion notes****EVALUATION**

1. Do we need to include vegetables in our daily diet? Suppose a farmer ask such a question to you, how will you react ?

**REFERENCE**

Vegetable Growing in India – Prem Singh Arya, Sant Prakash

**CURRICULUM OBJECTIVE -2**

Learner understands the factors affecting vegetable production, problems, prospects and classification of vegetables through collection of specimens, group discussion and prepares tables and notes.

**SYLLABUS**

Factors affecting vegetable production – problems and prospects – Classification of vegetables

**LEARNING EXPERIENCE****a) Collection of Specimens**

**Materials** Specimens of common vegetables

Note to the facilitator:

Direct the learners to collect and bring different kinds of vegetable available in his locality well in advance.

Facilitator instructs the groups to classify vegetables into different groups as they like but they have to state the criterion. Direct each group to prepare a classification table. Groups present their table. Through a whole class discussion, the facilitator consolidates.

**b) Group Discussion**

The facilitator divides the learners into different groups. She initiates the discussion by asking the following questions:

- List out the vegetables cultivated in your area ?
- Do you get uniform yields regularly?
- If no, why ?
- What measures will you take to overcome the problems in the cultivation?

Each group gathers information among themselves and presents the idea before the class. The facilitator combines the data presented by all groups. She supplements missed information if any.

## **CONSOLIDATION**

- ❖ Factors affecting vegetable seed production
  - Soil & climate
  - Cultural practices
  - Pest and diseases
  -
- ❖ Problems and prospects of vegetable cultivation
  - Low productivity
  - Poor management practices
  - Inadequate post harvest technology
  - Inadequate availability of HYV and hybrids
  - Unorganized marketing system
- ❖ Classification of vegetables based on
  - Part used as food
    - i) Fruits - eg : Brinjal, Tomato, Cucumber, Bhindi
    - ii) Flower - eg : Cauliflower, Agathi
    - iii) Leaves - eg : Amaranthus, Cabbage
    - iv) Roots - eg : Carrot, Beetroot
    - v) Tuber - eg : Potato, Sweet potato
    - vi) Bulb - eg : Onion, Garlic
    - vii) Seed - eg : Peas, Beans
  - Temperature requirement
    - i) Warm season vegetables - eg : Brinjal, Cucumber, Pumpkin
    - ii) Cool season vegetables - eg : Cabbage, Cauliflower
  - Cultural practices
    - i) Cole crops - eg: Cabbage, Cauliflower
    - ii) Root crops - eg: Carrot, Beetroot
    - iii) Leguminous crops - eg: Cowpea, cluster bean

- iv) Solanaceous crops - eg: Tomato, Brinjal, Chilly
- v) Cucurbits - eg: Cucumber, Pumpkin, Snake gourd
- vi) Leafy vegetables - eg: Amaranthus, Chekurumanis
- vii) Tuber crops - eg: Potato, Sweet potato
- viii) Bulb crops - eg : Onion, Garlic
- ix) Salad vegetables - eg: Celery, Lettuce
- x) Malvaceous crop - eg: Bhindi
- xi) Perennial crops - eg: Drumstick, Chekurumanis

➤ Hardiness

- i) Hardy vegetables : Cabbage, Raddish, Onion
- ii) Tender vegetables : Brinjal, Cucumber, Pumpkin

➤ Method of propagation

- i) By seeds
  - a. Direct sown vegetables - Cucumber, Bhindi
  - b. Transplanted vegetables - Brinjal, Chilly
- ii) By cuttings - Drumstick, Chekurumanis
- iii) By tubers - Potato

## PRODUCT

Tables, Discussion notes

## EVALUATION

1. Match the following

- Leaves - Carrot
- Root - Amaranthus
- Tuber - Cauliflower
- Flower - Bhindi
- Fruit - Colocasia

2. Suppose a farmer approaches you to get solution to the poor yield that he is getting from an area of 10 cents of Amaranthus. Give all the possible reasons and suggest remedial measures.

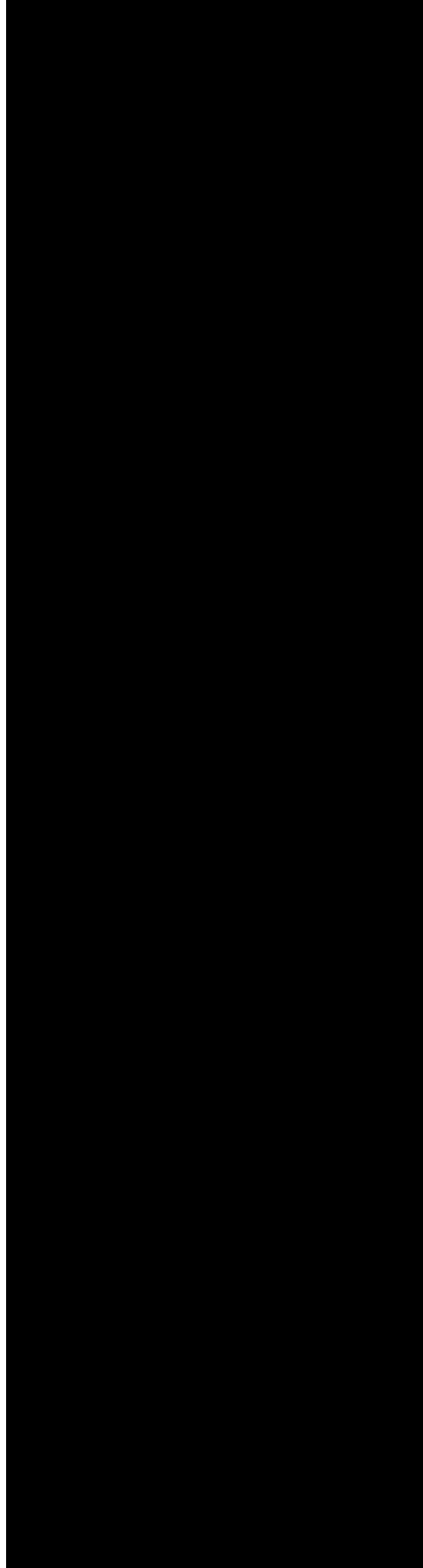
## REFERENCE

Vegetable Production in India D.V.S.Chauhan

**UNIT -7**  
**TYPES OF VEGETABLE GROWING**

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## UNIT . 7

# TYPES OF VEGETABLE GROWING

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### INTRODUCTION

Homestead system of farming is predominant in Kerala. This system is characterized by warm humid tropical crops predominated by perennials. Among these, vegetables play a vital role.

This chapter aims to familiarize with the different types of vegetable growing practiced in India. Learner experiences the scientific and technical aspects of types of vegetable growing.

### CURRICULUM OBJECTIVE

Learner understands the different types of vegetable growing – kitchen garden, truck garden, market garden, vegetable forcing, vegetable seed production through discussion referencing secondary sources, demonstration and prepares discussion notes.

### SYLLABUS

Various types of vegetable growing – Kitchen garden – truck garden – market garden – vegetable forcing – vegetable seed production.

### LEARNING EXPERIENCE

Discussion and Demonstration

**Materials:** Implements, planting materials, other infrastructural facilities, photographs

Facilitator divides the learners into 4 groups. She initiates a discussion about the various types of vegetable cultivation. After this, let the groups refer the photographs. Then give a demonstration plot for raising vegetables for each group.

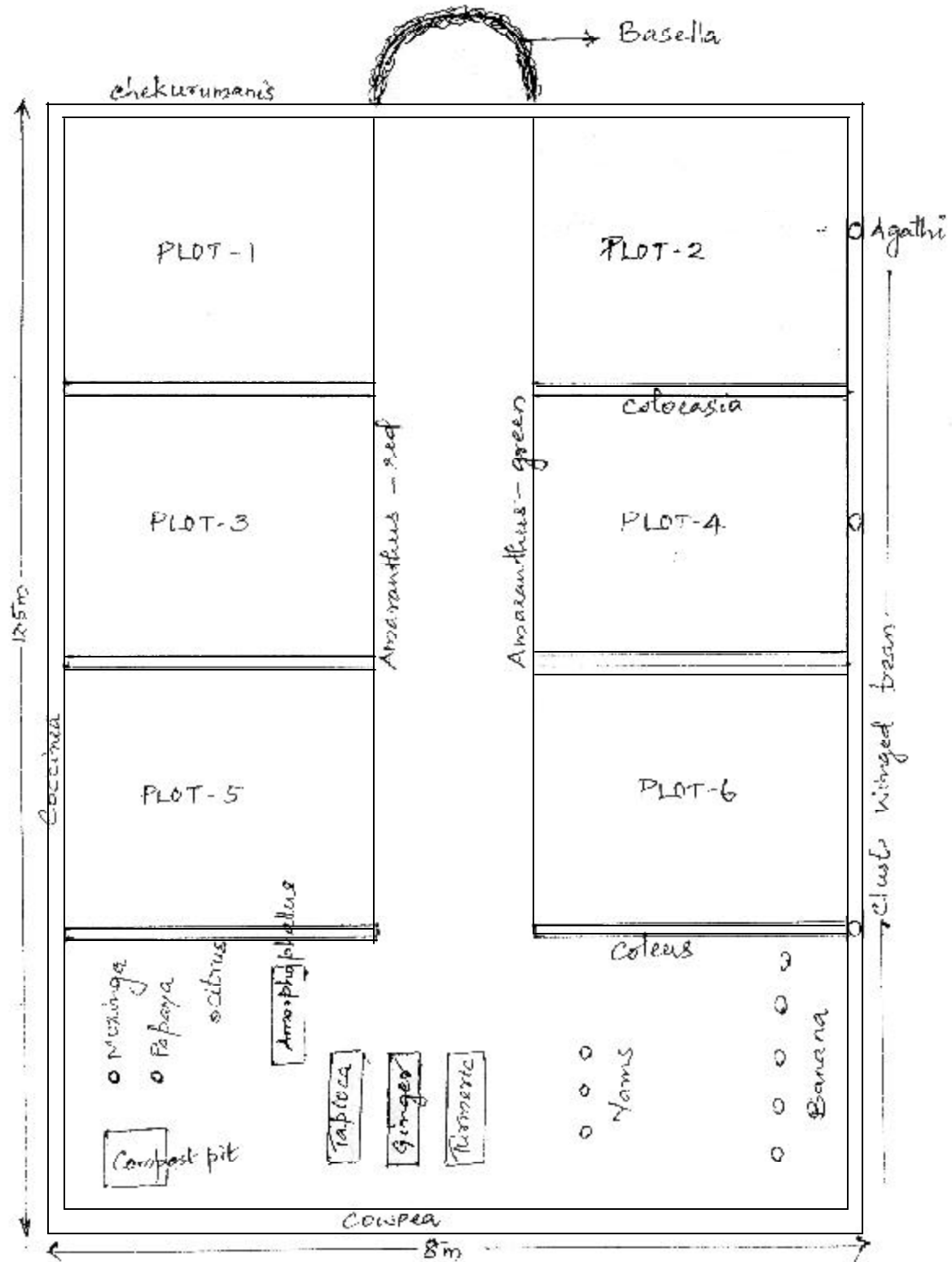
### CONSOLIDATION

Different types of vegetable growing :

#### 1. Kitchen garden

Main purpose of kitchen garden is to provide the family daily with fresh vegetables rich

### LAYOUT OF A KITCHEN GARDEN



in nutrients and energy. There is continuous supply of vegetables throughout the year according to the season.

## **2. Market garden**

It is the type of vegetable growing whose object is to produce vegetables for the local market. It is one of the most intensive type of vegetable gardening. Here the most skillful methods for growing of vegetables for commercial purposes are employed.

## **3. Truck garden**

It is the method of growing special vegetable crops in relatively large quantities for distant market by the employment of extensive methods. On this method of gardening, there is comparatively less intensive cultivation and land values are also lower than market gardening.

## **4. Vegetable forcing**

It is the method of growing vegetables out of normal season in cellars, heated buildings, green houses, cold frames and under other artificial growing conditions. It is the most intensive type of vegetable growing.

## **5. Vegetable garden for processing**

Vegetables are generally grown around vegetable processing units for the regular supply of vegetables to the factories.

## **6. Vegetable garden for seed production**

Vegetables are grown for the purpose of seed production. Vegetables are not harvested fresh.

## **PRODUCT**

Discussion notes

## **EVALUATION**

1. A farmer is having 2 cents of land in the backyard. What suggestions will you offer him to make use of the land effectively?
2. A farmer residing in urban area does not have cultivable land. But he is very much interested in vegetable cultivation. How will he make use of the vegetable kit supplied from the Krishibhavan ?

## **REFERENCE**

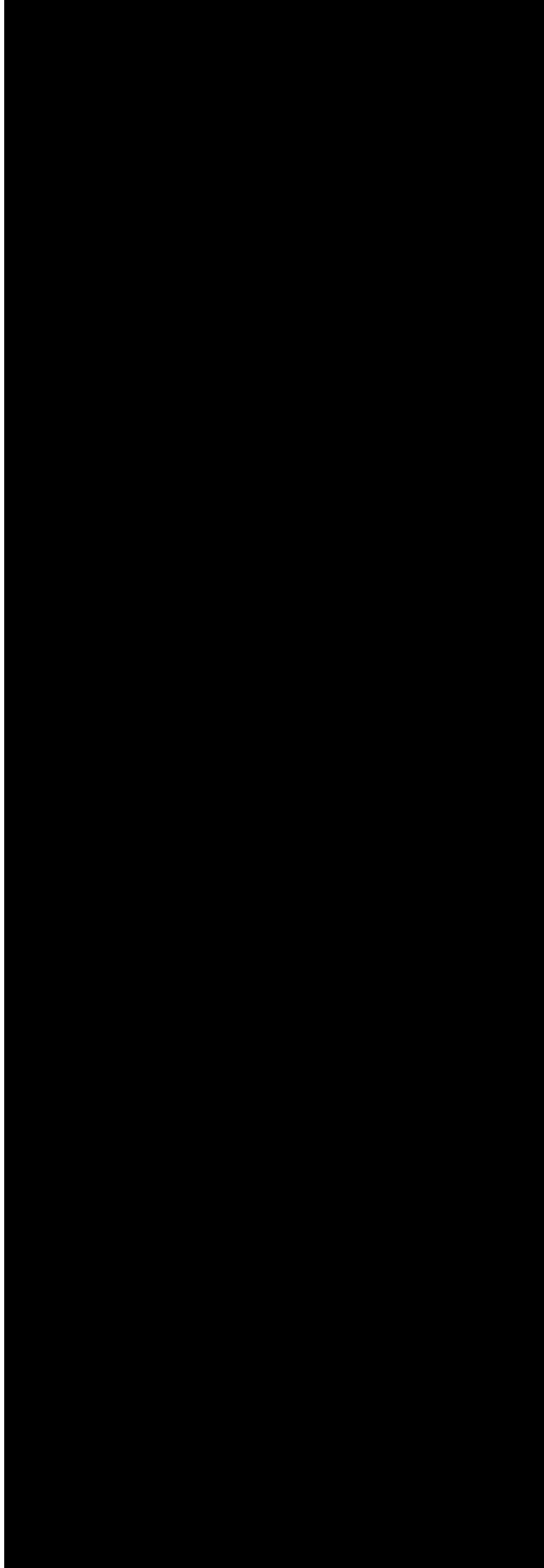
Vegetable Production in India - D.V.S.Chauhan

Vegetable Growing in India – Prem Singh Arya, Sant Prakash

**UNIT -8**  
**SUMMER SEASON VEGETABLES**

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## UNIT – 8

# SUMMER SEASON VEGETABLES

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### INTRODUCTION

Vegetables play a vital role in the health and nutritional security of the human population of any nation. Vegetables give higher tonnage per unit area than the cereals, besides better food value. India is a vast country bestowed with a wide range of agro-climatic conditions thus enabling to grow fresh vegetables in one part or the other.

This chapter includes various scientific cultivation practices, which could be adopted to improve the growth and yield of vegetables. This chapter aims to bring the learner closer to the real life activity of experiencing, observing the actual process of crop production with a scientific and technical outlook.

### CURRICULUM OBJECTIVE

Learner gets an idea of the cultivation practices of cucurbits, solanaceous vegetables, leguminous vegetables, amaranthus, okra, coleus, colocasia, amorphophallus and perennial vegetables through interview with farmers, group discussion and method demonstration and prepares reports and discussion notes.

### SYLLABUS

Important varieties with the salient features – climatic and soil requirements – selection of seeds – sowing methods and nursery preparation – technique of main field preparation and transplanting – manurial and fertilizer recommendations – intercultural operations – problems and plant protection measures – correct maturity stage for harvest – post harvest handling – storage and packing of summer vegetables.

#### LEARNING EXPERIENCE

##### a) Interview with farmer :

**Materials :** Interview schedule

Divide the learners into 5 groups. Let them plan for the interview –

- (ii) Data to be collected

- (iii) Sources to be fixed
- (iv) Date and time
- (v) Tools [ Interview schedule] and materials
- (vi) Duties

Groups prepare interview schedule. Let them present in the whole class. Refine the interview schedule. A model can be like this.

<b>Crop</b>	<b>Season</b>	<b>Seed rate</b>	<b>Spacing</b>	<b>Varieties</b>	<b>Manures&amp; fertilizers</b>	<b>Inter cultural operations</b>	<b>P.P Measures</b>	<b>Time of Harvest</b>
Cucurbits								
Solanaceous Vegetables								
Leguminous vegetables								
Amaranthus								
Okra								
Tuber crops								
Perennial crops								

Note :-For the interview farmer can be invited to the school or learner can go to the farmer.

#### **Data collection [Actual interview]**

Based on the interview schedule let them collect the relevant information from the farmer. The other learners make note of the important points. Ensure that each learner prepares the interview report. The performance of each learner must be evaluated thoroughly as a part of practical evaluation.

#### **b) Method demonstration**

Each learner group is allotted a particular vegetable. They asked to cultivate these vegetables in the demonstration plot or home. By this all the learner will get exposed to cultivation practices of different summer vegetables.

### **CONSOLIDATION**

The cultivation practices of different summer vegetables

- Soil and Climate

- Varieties
- Seeds and sowing
- Main field preparation
- Planting
- Manuring
- Intercultural operations
- Plant protection measures
- Harvesting & storage

### Important varieties of common vegetables

Crop	Varieties
<b>Cucurbitaceous crops</b>	
Bittergourd	Priya, Preethi, Priyanka, Arka Harith
Snake gourd	Kaumudi, Baby, TA-19
Oriental pickling melon	Mudicode local, Arunima, Soubhagya
Cucumber	Pusa seethal, Poinsette, Poona Khira
Water melon	Sugar baby, Pusa bedana, Arka jyothy
Bottle gourd	Pusa summer Prolific long, Arka bahar
Pumpkin	Ambili, Suvarna, Saras
Ashgourd	KAU Local, Indu
<b>Solanaceous crops</b>	
Brinjal	Surya, Swetha, Haritha, Neelima
Chilly	Jwalamukhi, Jwalasakhi, Ujwala, Manjari, Anugraha
Tomato	Sakthi, Mukthi, Anakha, Pusa Ruby
<b>Leguminous crops</b>	
Cow pea	
a) Vegetable type - Bushy	Bhagyalakshmi, Pusa barsathi, Pusa komal
- Semitrailing	Kairali, Varun, Kanakamony, Arka garima, Anaswara

- Trailing	Sarika, Malika, Vaijyanthi, Manjari local
b) Grain type	Pusa phalguni, Pusa dophasly, Krishnamony, Pournami
c) Dual purpose type	Kanakamony, New Era
d) Companion crop with tapioca	V-26
e) Floor crop	Cowpea -2
Amaranthus - Red - Green	Kannara local, Arun CO-1, 2, 3, Mohini
Okra - Green Red Yellow vein mosaic resistant	Pusa sawani, Pusa makhmali, Kiran, Salkeerthi CO-1, Aruna Arka anamika, Arka abhay, Susthira
Coleus	Nidhi, Sreedhara
Colocasia	Sree reshmi, Sree pallavi
Amorphophallus	Sreepadma, Gajraj
Moringa	Jafna, PKM -1

## PRODUCT

Reports, Notes

## EVALUATION

Members of a residential colony wish to cultivate Bhindi in their area. Give them necessary instructions regarding planting, manuring, irrigation and plant protection.

## REFERENCE

Hand Book of Agriculture - ICAR

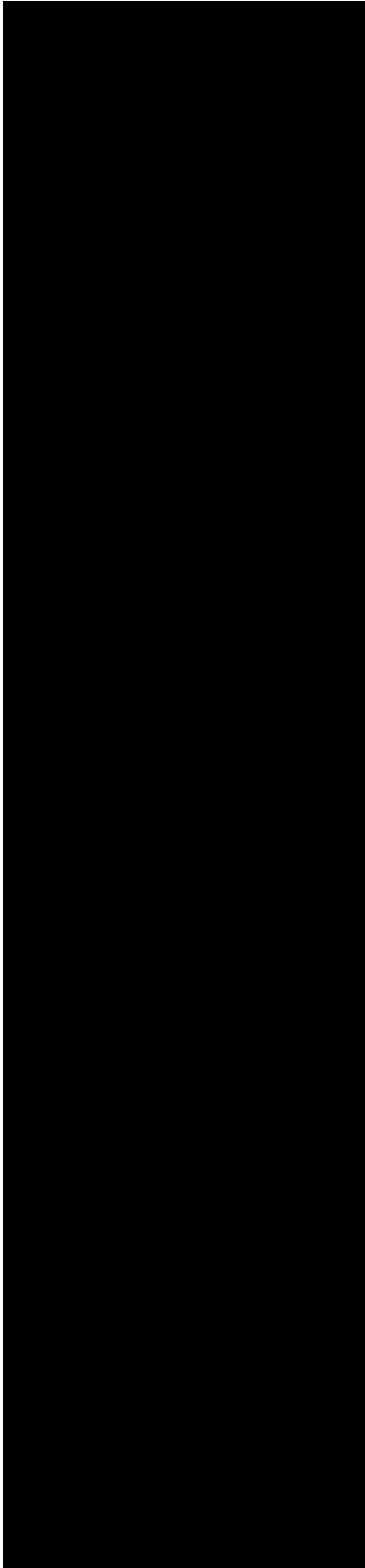
Package of Practices Recommendation - KAU

Vegetable Production in India – D.V.S.Chauhan

**UNIT – 9**  
**COOL SEASON VEGETABLES**

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## UNIT – 9

# COOL SEASON VEGETABLES

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### INTRODUCTION

Various cool season vegetables like cabbage, cauliflower and green peas are cultivated in high range areas of Kerala. But their cultivation is not yet organized in the state. Development prospects in this sector are to be initialized so that we can further increase the production of these crops. This chapter enables the learner to identify different cool season vegetables grown in our country.

### CURRICULUM OBJECTIVE

Learner gets an idea of the important cool season vegetables and their places of growing through collection, identification, referencing secondary sources, discussion and prepares notes.

### SYLLABUS

Listing cool season vegetables- places of growing – cabbage, cauliflower, carrot, raddish, beetroot, turnip, potato, onion, peas and beans.

### LEARNING EXPERIENCE

**Materials** : Specimens , photographs

The facilitator should direct well in advance to bring the samples of common cool season vegetables. The specimens are collected, and the learners are asked to identify these vegetables. Then the facilitator supplies the photographs of rare specimens. Now he discusses the places of growing of each of these vegetables.

### CONSOLIDATION

- Different types of cool season vegetables and their places of growing

### PRODUCT

Discussion notes

### EVALUATION

After a visit to Ooty, a man was sharing his experience with his kids. He was telling about the vegetables he had seen there. What may be the type of vegetables that he came across?

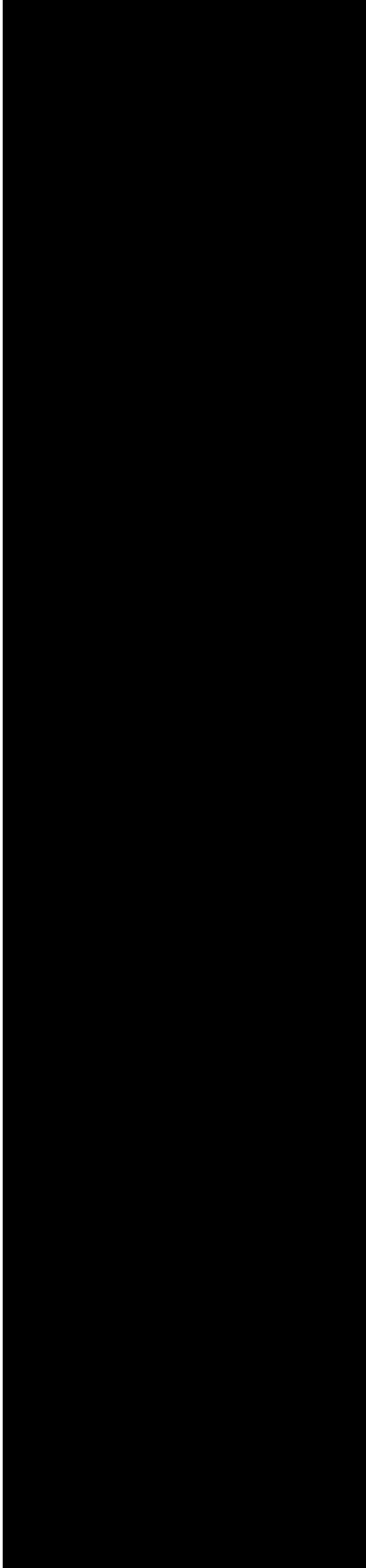
### REFERENCE

Vegetable Production in India - D.V.S.Chauhan

**UNIT - 10**  
**VEGETABLE SEED PRODUCTION**

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## **UNIT-10**

# **VEGETABLE SEED PRODUCTION**

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### **INTRODUCTION**

The planting of good seed is essential for the success of vegetable cultivation. However expert and efficient a vegetable producer may be, he cannot achieve success with poor seed, even when he gives his closest attention on other factors of production. Pure and healthy seed is of paramount importance for vegetable production. Good seed is the basis for profitable agriculture. Growth of a plant begins with the germination of its important propogule, the seed. A seed is a mature ovule containing a miniature plant in an arrested state of development.

In this unit, we try to make the learner aware of the qualities of the seeds, classes of seeds and methods of seed production. Here the learners get a thorough knowledge regarding the establishment of a seed production unit.

### **CURRICULUM OBJECTIVE**

Learner understands the qualities of good seed, classes of seeds and various methods of seed production through referencing secondary sources, brainstorming and discussion and prepares notes.

### **SYLLABUS**

Various methods of seed production – different classes of seeds – different qualities of seeds - importance of isolation distance , rouging, hybrid seed production, fruit harvesting, seed extraction, processing, drying, packing and storage.

### **LEARNING EXPERIENCE**

#### **a) Data collection from secondary sources**

**Materials** Handouts

The facilitator prepares handouts regarding classification and qualities of seeds. She distributes the handouts to the learners. Let them go through the handouts and present the ideas they conceived. Through a general discussion, the teacher consolidates the ideas.

**b) Brainstorming**

The facilitator initiates discussion by asking questions like

- o What are the criteria that you will consider while selecting seeds for cultivation in your home ?
- o Which is the class of seed that is distributed from the nearby Krishibhavan ?
- o How will you store seeds for cultivation in the next season?

The facilitator lists out the points in the black board and explains all the aspects regarding vegetable seed production.

**CONSOLIDATION****HAND OUT****Classes of seeds**

- > Breeder seed
- > Registered seed
- > Foundation seed
- > Certified seed

**Classes of seeds**

- Breeder seed : This class of seed is produced by a plant breeder. It has 100 % physical and genetic purity.
- Foundation seed : It is the progeny of breeder seed and is multiplied in Govt. seed farm under the direct supervision of trained official. It is 100 % genetically and physically pure.
- Registered seed : It is the progeny of foundation seed and is multiplied in progressive farmer's field under the supervision of seed instructor.
- Certified seed : It is the progeny of foundation seed or registered seed. These are multiplied in progressive farmers field under the strict supervision of seed inspector and get certified by a seed certification agency. These are produced in large quantities and supplied to the farmers for cultivation.

## **HAND OUT**

### **Qualities of good seed**

- True to type
- Viable and pure
- Uniform in shape, size & colour
- Free from seed borne diseases & insect pests
- Free from inert matter
- Free from weed seeds and other crop seeds.

## **HAND OUT**

### **Methods of seed production**

- Seed to seed
- Head to seed
- Root to seed

## **PRODUCT**

Discussion notes

## **EVALUATION**

A farmer in your Panchayat purchased some vegetable seeds from the local market. Out of the total seeds, only 10% germinated and the whole lot was found contaminated with inert matter and weed seeds. As an Agricultural Officer, what suggestions will you provide regarding the source of purchase of good seeds ?

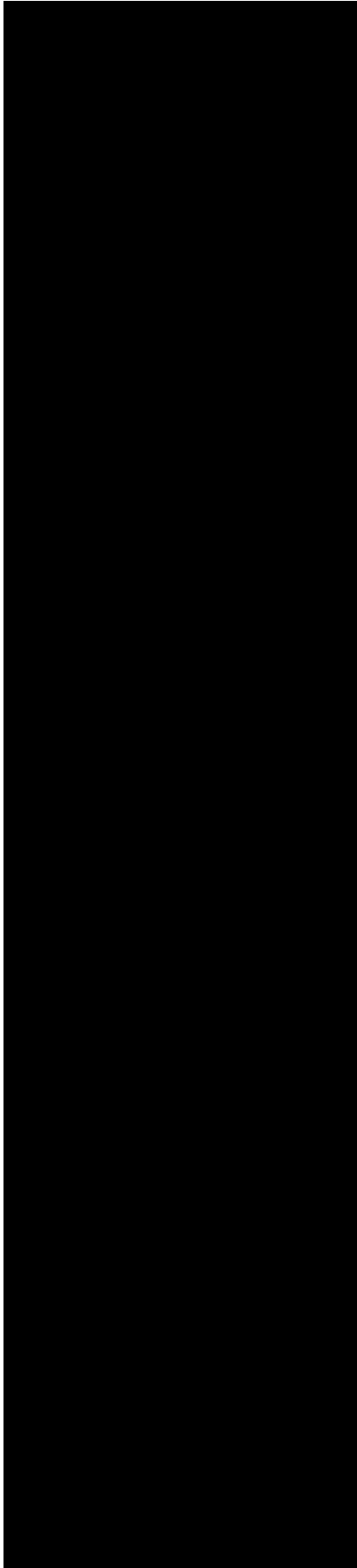
## **REFERENCE**

Vegetable Production in India D.V.S.Chauhan

**UNIT – 11**  
**POST HARVEST TECHNOLOGY**

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## UNIT – 11

# POST HARVEST TECHNOLOGY

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### INTRODUCTION

Agricultural production is season bound. But the demand is through out the year. Moreover, most of the agricultural products are perishable. So we have to preserve the products harvested in the peak season. Some products cannot be consumed directly. They have to undergo different processes before consumption. For export purpose also, the agricultural products should be processed in such a way that it should remain in good condition for a long time. This can be achieved through processing, packing and safe storage.

The processing technology is inevitable for diversification of products and making various value added products. In this unit, the learner get an idea about causes of spoilage of fruits and vegetables and importance of post harvest technology.

### CURRICULUM OBJECTIVE

The learner acquires an idea about the different causes of spoilage of fruits and vegetables and importance of post harvest technology through collection of specimens, discussions and prepares notes.

### SYLLABUS

Importance of post harvest technology – causes of spoilage of fruits and vegetables

### LEARNING EXPERIENCE

The facilitator asks the learners to collect specimens of spoiled fruits and vegetables from their home well in advance.

**Learners are given the following discussion points .**

- (vii) Imagine there are some surplus fruits and vegetables in your house; what will happen if it is not consumed within 2 or 3 days ?
- (viii) What will you do for avoiding spoilage of fruits and vegetables ?
- (ix) What are the steps to be followed before storing surplus fruits and vegetables ?

Based on the information obtained from general discussion, the facilitator helps the learners to understand the causes of spoilage and also importance of post harvest technology.

### **CONSOLIDATION**

- ❖ Importance of post harvest technology
  - Prevents degradation of fruits and vegetables and maintain them in a good condition for a reasonable period of time.
  - Helps to earn remunerative price during off season.
  - Extends storability and marketing of fruits and vegetables.
  - Creates employment opportunities.
- ❖ Causes of spoilage of fruits and vegetables

Spoilage may be due to –

- a) Activity of microorganisms
- b) Loss of water.
- c) Physiological causes
- d) Enzymatic changes

.Post harvest loss in fruits and vegetables are about 20-40 %. About 36 % of vegetables decay due to soft rot bacteria. About 30 % of fruits decay due to fungi. Losses can be minimized by pre and post harvest treatments.

### **PRODUCT**

Discussion notes

### **EVALUATION**

There is surplus of mango fruits in your home. A few of them is found spoiled. Suggest the causes for the spoilage of fruits ?

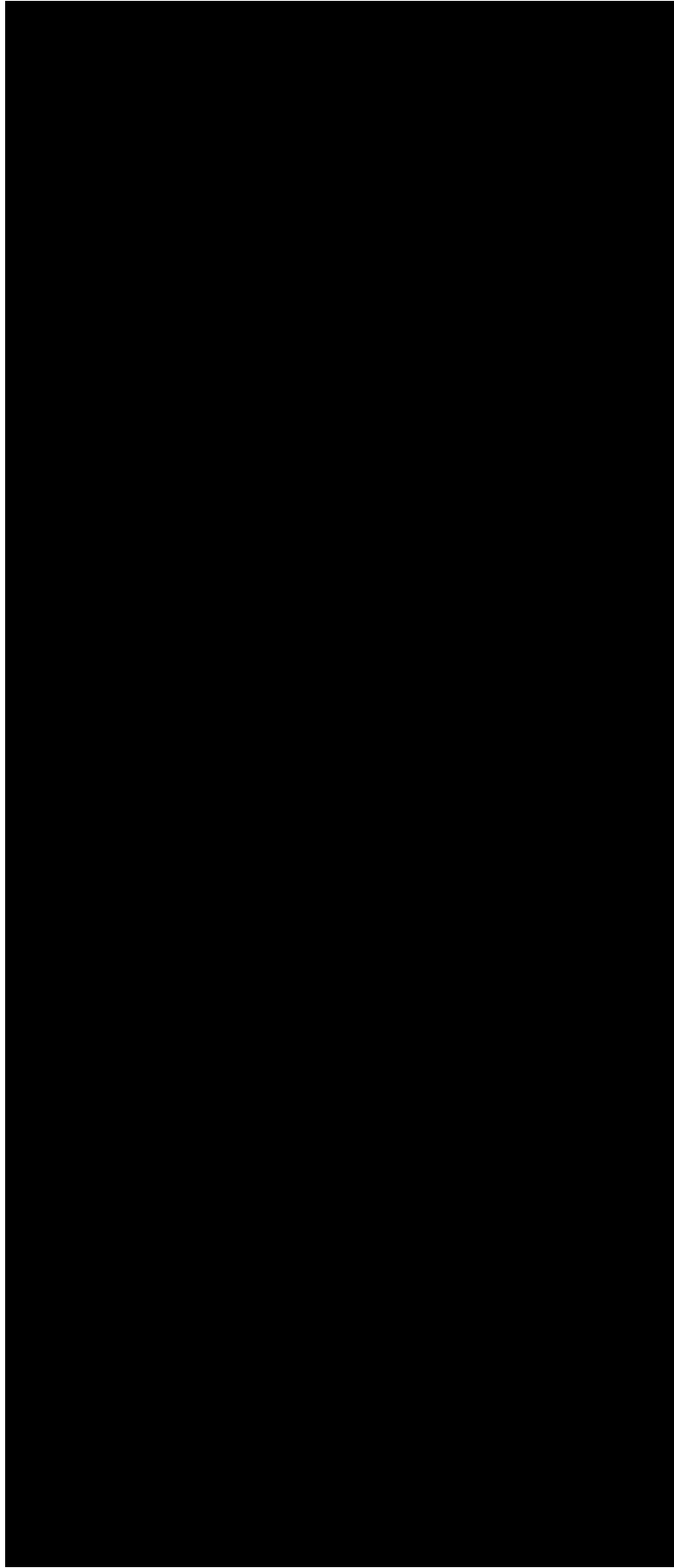
### **REFERENCE**

Preservation of fruits and vegetables - Girdhari Lal, G.S. Siddhappa, G.L.Tandon

**UNIT-12**  
**PRESERVATION OF FRUITS AND VEGETABLES**

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# UNIT-12

## PRESERVATION OF FRUITS AND VEGETABLES

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### INTRODUCTION

Horticulture can make rapid progress in India if the fresh surplus produces are scientifically preserved and the products are marketed properly. Food preservation has been practiced in one form or other by sun drying, cooking, smoking, pickling in salt etc. since the dawn of civilization.

Preservation for limited period may be achieved by retarding the activity of enzymes and microorganisms by refrigeration, large scale addition of chemicals like salt, sugar, exclusion of moisture and air.

The processing techniques of agricultural goods in this unit helps to build up vocational skill in making value added products. This provides ample scope for self-employment and employment generation.

### CURRICULUM OBJECTIVE – 1

Learner understands the various methods of keeping the fruits and vegetables for shorter and longer periods through assignments, discussion and prepares reports and discussion notes.

### SYLLABUS

Methods of preservation – dehydration, freezing and canning

### LEARNING EXPERIENCE

#### Assignment and Discussion

**Materials** Reference books, Periodicals

The facilitator divides the learners into groups. She asks the learners to collect information regarding various methods of preservation from periodicals and reference books and present the report in the whole class.

The facilitator discusses the topic and supplements the missed information and the learner prepares discussion notes.

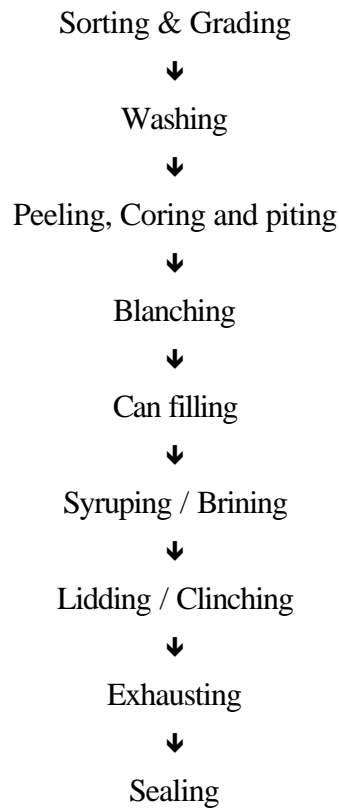
## CONSOLIDATION

- Two types of preservation – temporary and permanent
  1. Temporary Preservation
    - Low temperature - eg. Refrigeration
    - Use of antiseptics - addition of mild solution of sugar or salt
    - Cleaning - washing and cleaning fruits / vegetables
    - Pasteurization - Fruit juices pasteurized at 80°C
  2. Permanent Preservation
    - Addition of sugar/salt/vinegar
      - Sugar – jam, jelly
      - Salt – Pickles
      - Vinegar - Pickles
    - Use of preservatives
      - Potassium meta bisulphate
      - Sodium benzoate
    - Drying and Dehydration
      - Sundrying
    - Fermentation
      - Wine
    - Canning
    - Deep freezing
- Methods of preservation by –
  - Dehydration

Fruits and vegetables are dried in the sun or dehydrated by machines in the absence of moisture destroys all bacteria and helps in permanent preservation.
  - Freezing

Freezing stops the activity of microorganisms.
  - Canning

Steps involved in canning are



## **PRODUCT**

Assignments, Discussion notes

## **EVALUATION**

Classify the following methods of preservation as temporary or permanent ?

a. Pasteurization b. Jam making c. Canning d. Dehydration

## **REFERENCE**

Fruit Physiology and Production - Amar Singh

Preservation of fruits and vegetables - Girdhari Lal, G.S. Siddhappa, G.L.Tandon

## **CURRICULUM OBJECTIVE –2**

Learner practices the preparation of jam, jelly , squash, juice and pickles through cookery show and prepares record of practicals and flowcharts.

## **SYLLABUS**

Preparation of jam, jelly , squash, juice and pickles

## LEARNING EXPERIENCE

### Cookery show

**Materials** Stove, mixie, sugar, water, fruit extract, knife, preservatives, refrigerator, bottles etc.

Pre-orient five learners (1 for each item) with the process of making that product. Divide the remaining learners into 5 groups. Arrange 5 corners in the class namely jam corner, jelly corner, squash corner, juice corner and pickle corner. The assigned learner demonstrates the process of making that item under the supervision of the facilitator. Others observe and understand the process. Group rotate till all the learners observe all the five items. Then the facilitator leads a discussion in the whole class to reinforce the various steps involved in the process of each item. Then direct each learner to practice the process in the school or house.

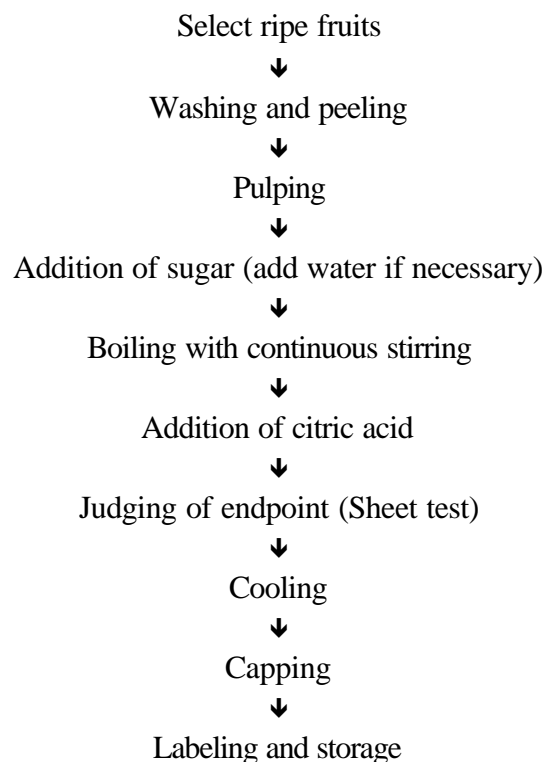
Note : (i) The cookery show may be arranged in 2 or 3 days considering the availability of required materials.

(ii) Facilitator should ensure that all the materials are arranged well in advance in each corner.

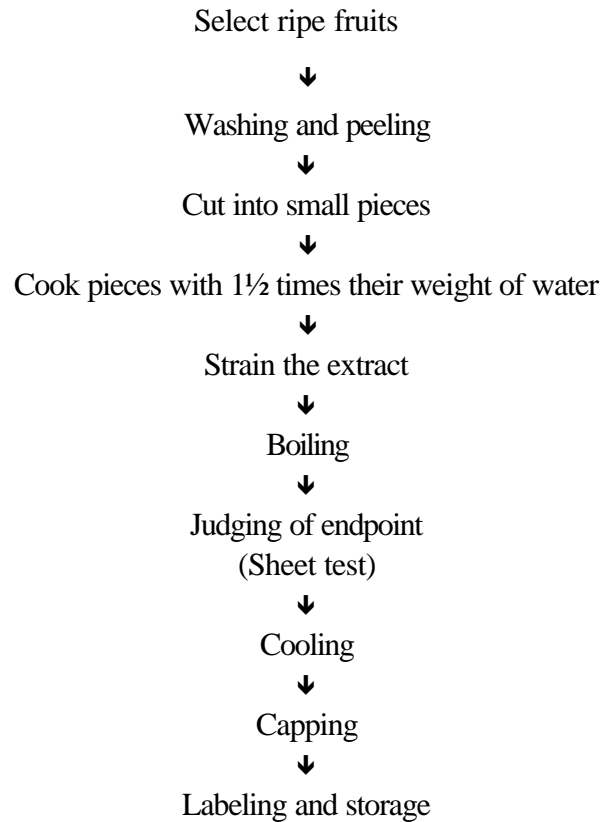
## CONSOLIDATION

- Preparation of jam, jelly, squash, juice and pickles

### Preparation of jam



### **Preparation of jelly**



### **PRODUCT**

Record of practicals, Flowcharts

### **EVALUATION**

How can you utilize the excess jack / guava fruit harvested in your house during peak season ?

### **REFERENCE**

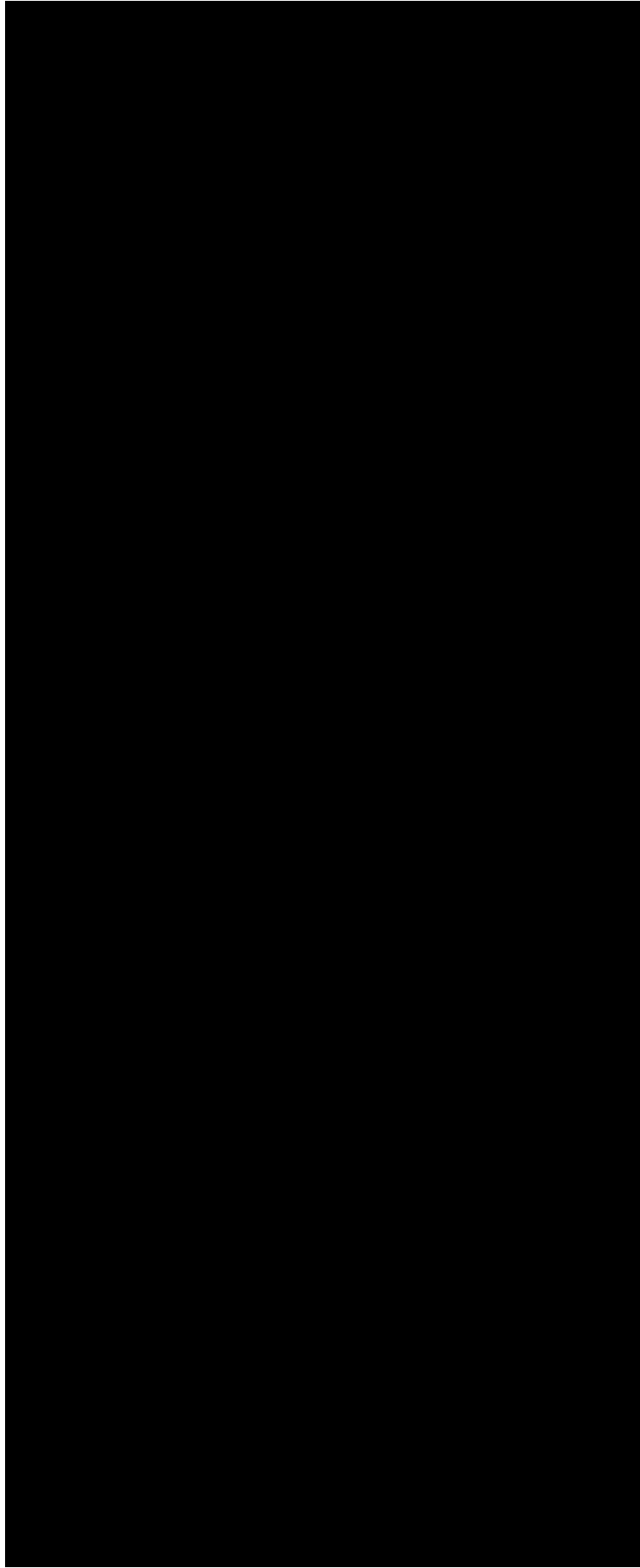
Fruit Physiology and Production - Amar Singh

Preservation of fruits and vegetables - Girdhari Lal, G.S. Siddhappa, G.L.Tandon

**UNIT-13**  
**PACKING AND STORAGE**

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# UNIT-13

## PACKING AND STORAGE

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### INTRODUCTION

Harvesting of crops is seasonal. But consumption of fruits and vegetables is continuous. The market value of the produce is generally low at the harvesting time. There is therefore necessity to store the produce for different periods.

The gains to the producer are possible only when the packing, storage, transport and processing of fruits are done in the right way in the right moment. Packing of fruits is of great importance. Proper storage to ward off post picking spoilage is a severe problem. It should be done in accordance with the needs of the fruit and the farmer. Proper storage has the advantage of keeping the supply of perishable fruit even in off season fetching high price to the farmer.

Through this chapter, learners are also expected to take part in activities for public awareness regarding the needs and significance of fruit preservation.

### CURRICULUM OBJECTIVE

Learner gets an idea about various methods of packing, storage of processed food materials and also the methods to prevent spoilage during storage through field visit and prepares reports.

### SYLLABUS

Methods of packing of fruits and vegetables and preserved food material for local and distant market – various equipments used in processing unit – problems in storage of processed materials – methods to prevent spoilage during storage.

### LEARNING EXPERIENCE

#### Field visit to a Processing unit

Facilitator leads a discussion for planning. The learners are guided to plan

- Data to be collected and recorded
- Institution to be visited

- Date and time of visit
- Conveyance
- Duties

**On the date of field visit,**

- Ensure that relevant and sufficient data (as planned earlier) are collected.
- Ensure that data are recorded on time.

After field visit, the learners are asked to share their experience by sharing the data collected and consolidate the relevant data. Direct each learner to prepare a report of the field visit.

**Notes :**

Important data to be collected from the processing unit

- Various methods of packing and storage of processed materials.
- Various equipments used in processing unit
- Methods to prevent spoilage during storage

**CONSOLIDATION**

- Different methods of packing fruits and vegetables
- Problems in storage of processed products
- Methods to prevent spoilage during storage

**PRODUCT**

Report

**EVALUATION**

You have got 500 number of mangoes from your home. There is no possibility for marketing due to bus strike. What are the ways by which he will preserve these fruits ?

**REFERENCE**

Fruit Physiology and Production - Amar Singh

Preservation of fruits and vegetables - Girdhari Lal, G.S. Siddhappa, G.L.Tandon

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# SYLLABUS

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<b>FRUITS AND VEGETABLES</b>	<b>SECOND YEAR</b>
<b>Introduction to pomology</b>	4 Hrs
Definition-economic and nutritive importance of fruits- factors affecting fruit production-problems and prospects- classification	
<b>Planting systems</b>	8 Hrs
Orchard layout-principles and practices-systems of advantages.	
<b>Tree fruits</b>	28 Hrs
Mango, jack, sapota, guava, citrus and cashew - varieties, climate and soil-propagation - progeny orchard - planting - manures and manuring - intercultural operations - problems - plant protection - harvesting – storage.	
<b>Other fruits</b>	15 Hrs
Banana.-pineapple and papaya-varieties, climate and soil-propagation-planting-manures and manuring-intercultural operations-use of growth regulators- ratooning-papain extraction-problems-plant protection-harvesting, storage	
<b>Minor fruits</b>	6/lrs
Listing minor fruits.-places of growing-grapes, mangostein, litchi, avocado, pomegranate, citrus fruits, apple, pear, peach, plum, cherry, rose apple, bilimbi. star fruit, West Indian cherry, eggfruit, Iovi-lovi, annona, caronda,etc.	
<b>Introduction to olericulture</b>	5 Hrs
Definition, economic, nutritive and medicinal importance- factors affecting vegetable production-problems and prospects- classification	
<b>Types of vegetable growing</b>	8 Hrs
Kitchen gardening, truck garden,. market garden, vegetable forcing, vegetable seed production.	
<b>Summer vegetables</b>	28 Hrs
Cultivation practices of cucurbits, solanaceous vegetables. leguminous vegetables, amaranthus, okra, coleus, colocasia, amorphophallus, and perennial vegetables	

(drumstick, breadfruit, coccinia, chekurumanis, etc.)- varieties, climate and, soil, seeds and sowing-main field preparation, planting, manures and manuring, intercultural operation, problems. plant protection, harvesting, storage and packing

**Cool season vegetables** 4 Hrs

Listing cool season vegetables-places of growing-cabbage, cauliflower, carrot, radish, beet, turnip, potato, onion, peas and beans, etc.

**Vegetable seed production** 10 Hrs

Classes of seed, qualities of good seed, seed production, isolation distance, rouging, harvesting, extraction, processing, drying, packing and storage.

**Post-harvest technology** 6 Hrs

Importance- causes of spoilage, principles of preservation

**Preservation of fruits and vegetables** 12 Hrs

Methods-temporary and permanent-dehydration, canning, freezing, preparation of jam, jelly, squash, pickles, and sauce.

**Packing and storage** 6 Hrs

Equipments and materials-storage problems-prevention of spoilage

**OBJECTIVES**

**Unit 1 : Introduction to pomology**

- 1.1.0. Define fruits and pomology and understand the various types of fruits and also to distinguish between botanical and horticultural fruits.
- 1.1.1 Understand the economic, nutritional and medicinal importance of fruits.
- 1.1.2 Understand the present status of area, production, requirement and gap in respect of major fruits in the country and the state
- 1.1.3 Enumerate the nutritional value of common fruits of Kerala
- 1.1.4 Describe the important factors affecting fruit production
- 1.1.5 List out important problems in fruit production and to suggest measures to overcome
- 1.1.6 Classify fruits based on climatic requirements

**Unit 2 : Planting systems**

- 2.1.0 Understand different systems of planting
- 2.1.1 Prepare the layout plan of an orchard
- 2.1.2 2.1.2 Describe the principles and practices of tree planting

**Unit 3 : Tree fruits**

- 3.1.1 Know the cultivation practices of important fruit crops like mango, jack, sapota, guava and cashew
- 3.1.2 List out important varieties of the above fruits
- 3.1.3 Understand the soil and climatic requirements
- 3.1.4 Know the most suitable methods of propagation
- 3.1.5 Develop the concept and importance of progeny orchard
- 3.1.6 Know to establish a progeny orchard
- 3.1.7 Explain the correct way of planting
- 3.1.8 Suggest the manurial and fertilizer recommendation
- 3.1.9 Describe the required pruning and training
- 3.1.10 Know the intercultural operations
- 3.1.11 Understand the alternate /irregular bearing tendencies in mango
- 3.1.12 Suggest remedial measures to overcome alternate/irregular bearing tendencies in mango
- 3.1.13 Suggest plant protection measures in fruit crops
- 3.1.14 Understand the correct stage of harvest
- 3.1.15 Know the correct methods of storage of fruits

**Unit 4: Other fruits**

- 4.1.0 Explain cultivation practices of other important fruits like banana, pine apple, and papaya
- 4.1.1 Enumerate the important varieties
- 4.1.2 Know the climatic and soil requirements
- 4.1.3 Elucidate the different methods of propagation
- 4.1.4 Describe the curing procedure of planting materials
- 4.1.5 Describe the method of planting
- 4.1.6 Give the manurial and fertilizer recommendations
- 4.1.7 Narrate the intercultural operations
- 4.1.8 Emphasize the use of growth regulators

- 4.1.9 Understand the systems of cultivation
- 4.1.10 Understand the method of papain extraction
- 4.1.11 Suggest the various plant protection measures to be adopted
- 4.1.12 Judge the harvest stage of maturity

**Unit 5 : Minor fruits**

- 5.1.0 Know the importance of minor fruits
- 5.1.1 List out the common names of minor fruits

**Unit 6 : Introduction to Olericulture**

- 1.1.0 Understand the scope and importance of vegetable crops
- 1.1.1 Define vegetable and Olericulture
- 1.1.2 Understand the economic importance of vegetables in Kerala
- 1.1.3 State the nutritive and medicinal importance of vegetables
- 1.1.4 List out the factors affecting vegetable production
- 1.1.5 Classify vegetables in different methods

**Unit 7 : Types of vegetable growing**

- 7.1.0 Enumerate the various types of vegetable growing
- 7.1.1 Describe the various systems of vegetable growing viz. kitchen garden, truck garden, market garden, vegetable forcing, vegetable seed production, etc.

**Unit 8 : Summer vegetables**

- 8.1.0 Describe the cultivation practices of cucurbits, solanaceous vegetables, leguminous vegetables, amaranthus, okra, coleus, colocasia, amorphophallus, and perennial vegetables (drumstick, breadfruit, coccinia, chekumanis, etc.)
- 8.1.1 List out the important varieties with their salient features
- 8.1.2 Explain the climatic and soil requirements
- 8.1.3 Describe selection of seeds, sowing methods and nursery preparation
- 8.1.4 Elucidate the technique of main field preparation and transplanting
- 8.1.5 Describe the manurial and fertilizer recommendation
- 8.1.6 Suggest the details of intercultural operations
- 8.1.7 Enumerate the problems and plant protection measures

8.1.9 Arrive at the correct maturity stage for harvest

8.1.10 Suggest the post harvest handling, storage and packing of vegetables

### **Unit 9 : Cool season vegetables**

9.1.0 List the important cool season vegetables and their places of growing

### **Unit 10: Vegetable garden for seed production**

10.1.0 Understand the various methods of seed production

10.1.1 List the classes and qualities of good seed

10.1.2 Emphasize the importance of isolation distance and rouging in seed production

10.1.3 Understand hybrid seeds and its production

10.1.3 Elucidate fruit harvesting, seed extraction, processing, drying, packing and storage.

### **Unit 11: Post-harvest technology**

11.1.0 Understand the importance of post harvest technology.

11.1.1 List the major causes of spoilage of fruits and vegetables

### **Unit 12: Preservation of fruits and vegetables**

12.1.0 Describe the various methods of preservation

12.1.1 Define dehydration, freezing and canning

12.1.2 Understand the principles of preservation by dehydration, freezing and canning

12.1.3 Elucidate the methods of dehydration, freezing and canning

12.1.4 Assess the problems in storage of processed foods

12.1.5 Describe the methods of preparation of jam, jelly, squash, juice and pickles

### **Unit 13: Packing and storage**

13.1.0 Know the various methods of packing of fruits, vegetables and preserved food materials

3.1.1 Understand the methods of packing of fruits and vegetables for local market and distant markets

3.1.2 Describe the methods of packing of preserved fruits and vegetables

3.1.3 Procure the various equipments used in processing units

3.1.4 Point out the problems in storage of processed materials

3.1.5 Suggest the methods to prevent spoilage in storage

## **FRUITS AND VEGETABLES SECOND YEAR**

### **Unit 1 Fruits** 150 Hrs

Planning and layout of orchards, planting systems, planting and after care, propagation, varietal identification of mango, jack, sapota, guava, citrus, and cashew- progeny orchard layout-plant protection.

### **Unit 2 Vegetables** 100 Hrs

Seed rate, nursery raising, transplanting, cultivation practices, plant protection, harvesting and preparation of cost of cultivation of important tropical vegetables like okra, brinjal, chilli, amaranthus, cowpea, cucurbits, etc.

### **Unit 3 Layout of kitchen garden/ Nutrition garden** 25Hrs

Planning, layout, crop rotations and maintenance of a garden Layout of kitchen garden/ Nutrition garden

### **Unit 4 Vegetable seed production**

Practices in production of quality seeds

### **Unit 5 Post harvest technology**

Preparation of jam, jelly, pickle, sauce and squash

### **Unit 6 Field visit**

Visit to research stations, farms and nurseries.

## **OBJECTIVES**

### **Unit 1 Fruits**

- 1.1.0 Scientifically cultivate the commercially important fruits viz. banana, pineapple, papaya and mango
- 1.1.1 Demonstrate perfectly the methods of propagation followed in fruits viz. grafting, budding, layering, and seed propagation
- 1.1.2 Prepare the nursery for fruit plants
- 1.1.3 Properly maintain the nursery
- 1.1.4 Prepare main field
- 1.1.5 Demonstrate application of manures and fertilizers
- 1.1.6 Practice intercultural operations
- 1.1.7 Identify major pests and diseases
- 1.1.8 Use various P.P. equipments

1.1.9 Practice different P.P operations

1.1.10 Demonstrate application of growth regulators in pineapple

## **Unit 2 Vegetables**

2.1.0 Scientifically cultivate the commercially important vegetables like bhindi, brinjal, chilli, cowpea, amaranthus and cucurbits

2.1.1 Work out the seed rate required

2.1.2 Prepare nursery and sow the various seeds at correct depth

2.1.3 Properly maintain the nursery

2.1.4 Prepare main field and transplant properly

2.1.5 Demonstrate application of manures and fertilizers

1.1.6 Practice intercultural operations

1.1.7 Identify major pests and diseases

1.1.8 Use various P.P. equipments

1.1.9 Practice different P.P operations

1.1.10 Work out and demonstrate application of growth regulators in cucurbits

2.1.10 Judge maturity stage for harvest

2.1.11 Prepare cost of cultivation

## **Unit 3 Layout of kitchen garden/ Nutrition garden**

3.1.0 Prepare the lay plan and layout the kitchen garden/nutrition garden

3.1.1 Practice the correct crop rotation so as to ensure supply of different vegetables for a family through out the year

## **Unit 4 Vegetable seed production**

4.1.0 Scientifically produce quality seeds of different vegetables

4.1.1 Follow different steps in seed production

## **Unit 5 Post harvest technology**

5.1.0 Demonstrate methods of post harvest handling of fruits and vegetables

5.1.1 Confidently prepare jams, jelly, squash, pickles, sauce and juice

## **Unit 6 Field visit**

- 6.1.0 Visit to agricultural and horticultural research stations
- 6.1.1 Identify different varieties of fruits and vegetables
- 6.1.2 Visit to farms and plantations
- 6.1.3 Convince scientific farm operations
- 6.1.4 Visit vegetable seed production units
- 6.1.5 See the various steps in seed harvesting, extraction, processing and storage
- 6.1.6 Visit fruits and vegetable processing units
- 6.1.7 Observe the actual methods of fruits and vegetable processing