

Strictly Confidential: (For Internal and Restricted use only)
Secondary /Senior School Certificate Examination-2020
Marking Scheme – AGRICULTURE (SUBJECT CODE - 808)
(PAPER CODE – 332)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully. **Evaluation is a 10-12 days mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
2. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In class-X, while evaluating two competency based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**
3. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. Evaluators will mark(✓) wherever answer is correct. For wrong answer 'X' be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
5. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
6. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
7. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
8. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
9. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.
10. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
11. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
 - Leaving answer or part thereof unassessed in an answer book.
 - Giving more marks for an answer than assigned to it.
 - Wrong totaling of marks awarded on a reply.

- Wrong transfer of marks from the inside pages of the answer book to the title page.
 - Wrong question wise totaling on the title page.
 - Wrong totaling of marks of the two columns on the title page.
 - Wrong grand total.
 - Marks in words and figures not tallying.
 - Wrong transfer of marks from the answer book to online award list.
 - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
 - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
12. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.
13. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
14. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
15. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
16. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges

SECTION A: EMPLOYABILITY SKILLS(10 MARKS)

- 1) Answer any 4 questions out of the given 6 questions of 1 mark each
- 2) Answer any 3 questions out of the given 5 questions of 2 marks each

SECTION B: SUBJECT SKILLS(60 MARKS)

- 1) Answer any 10 questions out of the given 12 questions of 1 mark each
- 2) Answer any 7 questions out of the given 9 questions of 2 marks each
- 3) Answer any 7 questions out of the given 9 questions of 3 marks each
- 4) Answer any 3 questions out of the given 5 questions of 5 marks each

**QUESTION PAPERS CONTAIN 46 QUESTIONS ,
OUT OF WHICH ONLY 34 ANSWERS ARE TO BE
CHECKED**

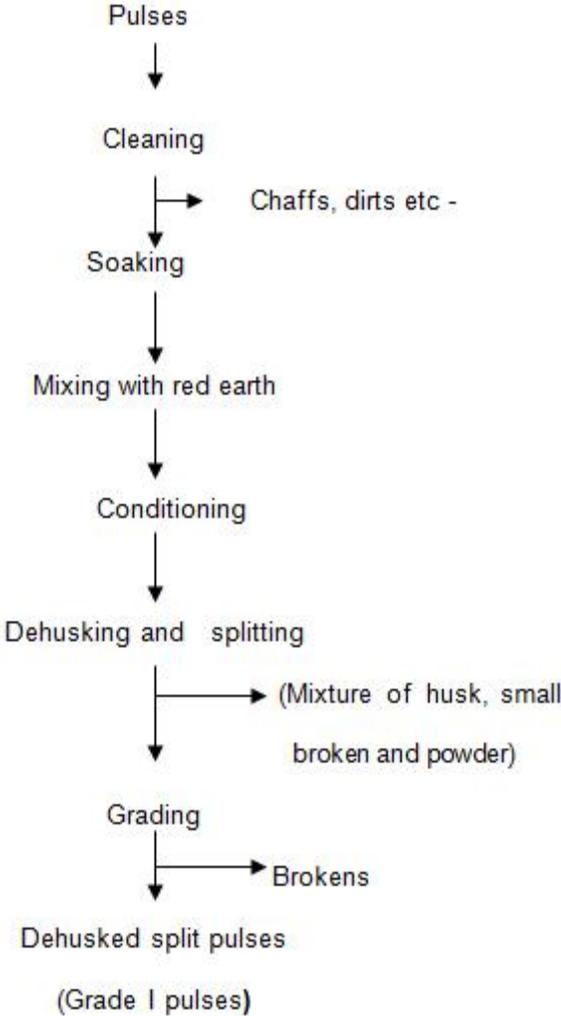
Q.No.	Value points/ Expected Answers/Desired Points	Marks
SECTION A: EMPLOYABILITY SKILLS		
Check Answer for 4 questions out of the given 6 questions of 1 mark each		
1	Music	1
2	Emotional stability	1
3	Quality	1
4	Ctrl + Shift + S	1
5	Ecosystem: A biological community of interacting organisms and their physical environment.	1
6	Stress management refers to taking systematic brakes, maintaining worklife balance, setting achievable goals, connecting with other like-minded entrepreneurs etc.	1
Check Answer for 3 questions out of the given 5 questions of 2 mark each		
7	Green jobs are decent jobs that contribute to preserve or restore the environment, be they in traditional sectors, such as in manufacturing and construction sectors or in the emerging green sectors such as renewal able energy.	2
8	Steps in active listening (Any two) 1) Pay Attention. Give the speaker your undivided attention 2) Show That You're Listening. ... 3) Provide Feedback. 4) Defer Judgment. 5) Respond Appropriately	2x 1 =2
9	Personality is relatively enduring set of traits. These traits are made up of be emotional, behavioral and mental set of characteristics. Heredity has been found to be determining personality apart from environmental forces. Personality is shaped through family, culture, society, education and other environmental factors.	2
10	MS Powerpoint , OpenOffice Impress	2x 1 =2
11	Following are the sources of motivation and inspiration.(Any four) a) Music : b) Books c) Activities : Engaging in positive and skill enhancing activities keeps our spirits high. Competitions, games, simulations, interviews for various committee positions are found to encourage, motivate and inspire students d) Expansive thoughts: Thinking and discussing big and positive ideas motivates us to reach to our highest potential. e) Living in the present f) Mindfulness helps students to pay attention, reduce stress and helps promote thoughtful approach towards life. g) Dreaming big : Dreaming big is a journey not a destination. Dreaming big helps us to be mentally prepared to take that big	4x ½ =2

SECTION B: SUBJECT SKILLS		
Check Answer for 10 questions out of the given 12 questions of 1 mark each		
12	Coarse cereals of India are : Jowar (Sorghum), Bajra (Pearl millet), Maize, Ragi (finger millet) (Any two)	$\frac{1}{2} + \frac{1}{2} = 1$
13	Major Rabi cereal crops of India: Wheat, Barley (Any two)	$\frac{1}{2} + \frac{1}{2} = 1$
14	Major pest of seed crops: Aphids, white grub, cut worm, pod borer, jassids (Any two)	$\frac{1}{2} + \frac{1}{2} = 1$
15	Major diseases of wheat: Bunt, Karnal bunt, Yellow rust, Brown rust, loose smut (Any two)	$\frac{1}{2} + \frac{1}{2} = 1$
16	Bioagents used for controlling agriculture pest in India (Any two) 1. Lady bird beetle 2. <i>Aphelinus mali</i> 3. <i>Videlia beetle</i>	$\frac{1}{2} + \frac{1}{2} = 1$
17	Commercial varieties of North India: (Any two) 1. Dashehari, 2. Langra, 3. Chausa, 4. Bombay green 5. Fajri 6. Amrapali	$\frac{1}{2} + \frac{1}{2} = 1$
18	Value added products from mango fruit: (Any two) 1. Amchur 2. Pickle 3. Panna 4. Squash 5. Chutney 6. Frooty	$\frac{1}{2} + \frac{1}{2} = 1$
19	<i>Agaricus bisporus</i>	1
20	Solanaceous vegetable: (Any two) 1. Potato 2. Tomato 3. Brinjal (Egg plant) 4. Chilli 5. Shimla Mirch (Capsicum)	$\frac{1}{2} + \frac{1}{2} = 1$
21	Royal jelly	1
22	Earthworm species suitable for vermicomposting (Any one) 1. <i>Perionyx excavatus</i> 2. <i>Lampito mauritii</i> 3. <i>Eisenia andrei</i> 4. <i>Eisenia fetida</i> (Red wigglers) 5. <i>Eudrilus eugeniae</i> 6. <i>Lampito mauritii</i> 7. <i>Lumbricus rubellus</i> (Red worm) 8. <i>Metaphire posthuma</i> 9. <i>Perionyx excavatus</i>	1

	<p>10. <i>Polypheretima elongata</i> 11. <i>Perionyx excavatus</i>, 12. <i>Octochaetona serrata</i> 13. <i>Lumbricus terrestris</i>,</p>	
23	<p>a) Muriate of potash or Potassium Chloride (KCl) b) Sulphate of potash (K_2SO_4).</p>	$\frac{1}{2} + \frac{1}{2} = 1$
<p>Check Answer for 7 questions out of the given 9 questions of 2 marks each</p>		
24	<p>Advantages of organic farming (any two) a) Farmers can reduce their production costs because they do not need to buy expensive chemical and fertilizers b) improvement in fertility status of soil c) Improves soil structure In the long term, organic farms save energy and protect the environment d) It can slow down global warming e) Fewer residues in soil</p>	1+1=2
25	<p><u>Crop rotation</u> Crop rotation is the practice of growing a series of dissimilar or different types of crops in the same area in sequenced seasons. It is done so that the soil of farms is not used for only one set of nutrients. It helps in reducing soil erosion and increases soil fertility and crop yield.</p>	2
26	<p>Methods of irrigation:-Irrigation water can be applied to crop lands using one of the following irrigation methods : (any four) (i)Surface irrigation (a)Uncontrolled (or wild or free) flooding method, (b)Border strip method, (c)Check method, (d)Basin method, (e) Ring method and (f)Furrow method. (ii)Subsurface irrigation (iii)Sprinkler irrigation (iv)Trickle (Drip) irrigation (v) Matka Irrigation Method</p>	$4 \times \frac{1}{2} = 2$
27	<p>Post harvest technology is inter-disciplinary "Science and Technique" applied to agricultural produce after harvest for its protection, conservation, processing, packaging, distribution, marketing, and utilization to meet the food and nutritional requirements of the people in relation to their needs. Or Post harvest technology is a set of handling practices and application that protect the quality of fresh fruits and vegetables from the time of harvest until the time of consumption.</p>	2
28	<p>Plant based bio-pesticide are naturally occurring plant material that may be crude preparation of the plant parts ground to produce a dust or powder that can be used in full strength or dilute form in a carrier such as clay, talc or diatomaceous earth. —Azadirachtin effects the reproductive and digestive procees of pest. Several plant based insecticides as nicotinoids, natural pyrethrins, rotenoids, neem products etc are</p>	1+1=2

	used.	
29	<p>Bee species (any two)</p> <p>a) <i>Apis dorsata</i> (The rock- bee)</p> <p>b) <i>Apis indica</i> (The Indian bee)</p> <p>c) <i>Apis florea</i> (The little bee)</p> <p>d) <i>Apis mellifera</i> (The European bee or Italian bee)</p>	1+1=2
30	<p>Integrated Pest Management (IPM) is that method of pest control, which utilizes all suitable techniques of pest control to reduce pest populations and maintain them below economic injury level.</p> <p style="text-align: center;">OR</p> <p>IPM is also defined as a stable system of crop protection, which based on the ecological relations within the crop and the environment, combines several methods of pest control in such a way that the pest is prevented from causing economic injury.</p>	2
31	<p>Value added products of wheat (Any four)</p> <p>a) Bread</p> <p>b) Pasta</p> <p>c) noodles</p> <p>d) crackers</p> <p>e) biscuits</p> <p>f) Semolina (sevian)</p> <p>g) cakes</p> <p>h) Muffins</p> <p>i) Cookies ,etc</p>	4x ½ =2
32	<p>Vermicomposting is the process of turning organic debris into worm castings. The worm castings are very important to the fertility of the soil. The castings contain high amounts of nitrogen, potassium, phosphorus, calcium, and magnesium. Castings contain: 5 times the available nitrogen, 7 times the available potash, and 1 ½ times more calcium than found in good topsoil.</p> <p>It is in expensive and only takes 2-3 months to produce vermicompst.</p>	2
Check Answer for 7 questions out of the given 9 questions of 3 marks each		
33	<p>Function of nitrogen in plants (Any three)</p> <p>a) N is biologically combined with C, H, O, and S to create amino acids, which are the building blocks of proteins. Amino acids are used in forming proto-plasm, the site for cell division and thus for plant growth and development.</p> <p>b) Since all plant enzymes are made of proteins, N is needed for all of the enzymatic reactions in a plant.</p> <p>c) N is a major part of the chlorophyll molecule and is therefore necessary for photosynthesis.</p> <p>d) N is a necessary component of several vitamins.</p> <p>e) N improves the quality and quantity of dry matter in leafy vegetables and protein in grain crops.</p>	3x1=3
34	<p>Maturity indices of apple (Any six)</p> <p>a) Days from full bloom</p> <p>b) Visual (OECD colour charts)</p> <p>c) Calendar date</p>	6x 1/2 =3

	<ul style="list-style-type: none"> d) Heat unit e) T-Stage f) Fruit retention strength g) Red color h) fruit size i) Firmness (Penetrometer /Fruit presser tester), j) soluble solids content (SS), Sugar content (Hand Refractrometer) k) starch index (Starch content -Iodine test) l) background skin color 	
35	<p>Maturity at harvest is the most important factor that determines storage-life and final fruit quality. Immature fruits are more subject to shrivelling and mechanical damage, and are of inferior flavour quality when ripe. Overripe fruits are likely to become soft and mealy with insipid flavour soon after harvest.</p> <p>Fruits picked either too early or too late in their season are more susceptible to postharvest physiological disorders than fruits picked at the proper maturity.</p> <p>All fruits, with a few exceptions (such as pears, avocados, and bananas), reach their best eating quality when allowed to ripen on the plant. However, some fruits are usually picked mature but unripe so that they can withstand the postharvest handling system when shipped long-distance.</p>	3
36	Steps in milling of pulses	3

	 <p style="text-align: center;">OR</p> <p>In general, the pulses have to undergo following unit operations for milling:</p> <ol style="list-style-type: none"> a) Cleaning and grading b) Drying c) Loosening of husk d) Dehusking e) Splitting f) Polishing 	
37	<p>The function of packaging are to contain, to protect product, to communicate (product identification) and to market the product. (Any three)</p> <ol style="list-style-type: none"> A. To contain produce <ol style="list-style-type: none"> i. As an efficient handling unit, easy to be handled by one person. ii. As a marketable unit. e.g. units with the same content and weight. B. To protect produce against <ol style="list-style-type: none"> i. Rough handling during loading, unloading and transport - rigid crate ii. Pressure during stacking. iii. Moisture or water loss with consequent weight and appearance loss. 	3x 1 =3

	<ul style="list-style-type: none"> iv. Heat: air flow through crate or box via ventilation holes. v. Fumigation possible through ventilation holes. <p>C. To communicate</p> <ul style="list-style-type: none"> i. Identification: a label with country of origin, volume, type or variety of product, manufacturing and expiry date, etc. printed on it. <p>D. Marketing, advertising: recognizable trade name and trademark.</p> <ul style="list-style-type: none"> i. To market the product ii. Proper packaging will lead to reduced injuries of fruits and vegetables and subsequently to improvement of appearance. iii. Standard units (weight, count) of a certain produce will increase speed and efficiency of marketing. iv. With reduced costs of transport and handling, stacking and combining of packages into layer units like pallets is possible. A more efficient use of space and reduced losses will lower the marketing costs. v. Labels and slots facilitate inspection. 	
<p>38</p>	<p>Lawn grasses (Any two)</p> <ul style="list-style-type: none"> a) <i>Cynodon dactylon</i> - Hariyali (or) Arugu (or) Doob grass b) <i>Stenotaphrum secundatum</i> -St. Augustine grass or Buffalo grass c) <i>Sporobolus tremulus</i> -Chain grass (or) Upparugu d) <i>Poa annua</i> -Annual blue grass e) <i>Pennisetum clandestinum</i> -Kikuyu grass f) <i>Zoisia japonica</i> -Japan grass g) <i>Z. matrella</i> -Manila grass h) <i>Z. tenuifolia</i> -Korean grass or velvet grass or carpet grass i) <i>Cynodon sp.</i> -Bermuda grass (or) Hyderabad grass j) <i>Cynodon sp.</i> -Dwarf Bermuda k) <i>Festuca sp.</i> -Fescue grass l) <i>Paspalum vaginatum</i> -Paspalum grass <p>Methods of lawn making (Any one)</p> <p>1. Seeding The most popular grass suitable for seeding is "Doob" grass (<i>Cynodon dactylon</i>). It has the fast spreading mat forming habit, radially forms roots at the nodes, the foliage is dark green, narrow with parallel vines. A lawn from seed is thought of only when grass roots are not available. About 30 kg of seed is required for planting one hectare. The soil should be reduced to fine tilth and given a light rolling. The site should be divided into suitable small squares or rectangles, the seeds are mixed with double the quantity of finely sieved soil and should be rolled again and watered liberally with rose can. The seeds take four to five weeks for germination. Care should be taken not to flood the site. For the first few times, the grasses are cut with a scythe. Lawn mower may be used for easy maintenance and for its spreading.</p> <p>2. Turfing The turfs are nothing but pieces of earth with compact grasses on them. These turfs should be cut uniformly in squares from a place where the grass is short, compact and free from weeds. These turfs should be placed on the prepared ground site, side by side and beaten down flat with a turf beater. The cavities in between should be filled with fine soil. The entire turfed area should be rolled and watered liberally. This is the most</p>	<p>1+2 =3</p>

	<p>expensive way of lawn making.</p> <p>3. Turf plastering The doob grass can be procured in large quantities free from weeds and chopped properly into small bits of 5-7 cm long. Two baskets of chopped grass pieces should be mixed well with one basket each of garden soil and fresh cow dung and a shovel full of wood ash with required quantity of water to form a thick pasty substance. This mixture is then spread uniformly on the surface of a previously wetted perfectly leveled ground to a thickness of at least 2.5cm and watering should be done with a rose can. The next day, ground should be rolled and the grass should be allowed to spread. The grass will shoot up in a fortnight. To start with, cut with a scythe and after three months, use the lawn mower.</p> <p>4. Dibbling roots This is the cheapest but time consuming method. Small pieces of grass roots should be dibbled 10 – 15 cm apart in a leveled ground when it is wet after rain. The roots spread and grow underground in the course of six months making a fairly compact lawn by frequent mowing, rolling and water in</p>	
<p>39</p>	<p>Methods of irrigation:-Irrigation water can be applied to crop lands using one of the following irrigation methods :</p> <p>(i)Surface irrigation (a)Uncontrolled (or wild or free) flooding method, (b)Border strip method, (c)Check method, (d)Basin method, (e) Ring method and (f)Furrow method.</p> <p>(ii)Subsurface irrigation (iii)Sprinkler irrigation (iv)Trickle (Drip) irrigation (v) Matka Irrigation Method</p> <p><u>SPRINKLER IRRIGATION:-</u> Sprinkling is the method of applying water to the soil surface in the form of a spray which is somewhat similar to rain. In this method, water is sprayed into the air and allowed to fall on the soil surface in a uniform pattern at a rate less than the infiltration rate of the soil. This method started in the beginning of this century and was initially limited to nurseries and orchards. In the beginning, it was used in humid regions as a supplemental method of irrigation. This method is popular in the developed countries and is gaining popularity in the developing countries too. Rotating sprinkler-head systems are commonly used for sprinkler irrigation. Each rotating sprinkler head applies water to a given area, size of which is governed by the nozzle 58 size and the water pressure. Alternatively, perforated pipe can be used to deliver water through very small holes which are drilled at close intervals along a segment of the circumference of a pipe. The trajectories of these jets provide fairly uniform application of water over a strip of cropland along both sides of the pipe. With the availability of flexible PVC pipes, the sprinkler systems can be made portable too.</p>	<p>1+2=3</p>

	Sprinklers have been used on all types of soils on lands of different topography and slopes, and for many crops	
40	<p>Value Addition: Extra value is created over and above the original value of any produce. It can apply to products, services, companies, management and other areas of business. In other words, value- addition is an enhancement made by a company/individual to a product or service before offering it to the end customer.</p> <p><u>Preparation of Rose water</u></p> <ol style="list-style-type: none"> 1. Remove all the rose petals and wash them lightly under lukewarm water. 2. Put the petals in a large pot and pour distilled water in it (just enough to cover them and not more). 3. Cover it and let the water simmer on low heat until the petals have lost all their color. 4. Strain the liquid and discard the petals. 5. Store rose water in a glass jar. 	1+2=3
41	<p>Advantages of bee keeping (Any three)</p> <ol style="list-style-type: none"> a) Bee keeping requires less time, money and infrastructure investments b) Honey and beeswax can be produced from an area of little agricultural value c) The Honey bee does not compete for resources with any other agricultural enterprise. d) Beekeeping has positive ecological consequences. Bees play an important role in the pollination of many flowering plants, thus increasing the yield of certain crops such as sunflower and various fruits. e) Honey is a delicious and highly nutritious food. By the traditional method of honey hunting many wild colonies of bees are destroyed. This can be prevented by raising bees in boxes and producing honey at home. f) Beekeeping can be initiated by individuals or groups g) The market potential for honey and wax is high 	3x 1=3
Check Answer for 3 questions out of the given 5 questions of 5 marks each		
42	<p>Components of Integrated Pest Management Various components and techniques that can be utilized in Integrated Pest Management programmes are as follows:</p> <ol style="list-style-type: none"> 1. Cultural control: Use of resistant varieties of crops is a promising technique in IPM. Moderately to low level of resistance is best integrated with chemical and bio control agents. Crop rotation and sanitation are also used to reduce the pest population to lower levels. 2. Mechanical control: Use of screens or barriers or handpicking in nursery stage of the crops and use of light traps to kill egg-laying adults can bring 	3+2=5

	<p>down the population for the other methods to be effective.</p> <p>3. Biological control: Natural enemies are commonly utilized in IPM programmes. Emphasis is given to protection and augmentation of indigenous natural enemies and recolonisation of those that have been wiped out due to indiscriminate use of insecticides.</p> <p>4. Chemical control: Minimal use of insecticides is recommended in IPM. Rule of the thumb is not to use insecticides unless absolutely necessary. Application methods that do not bring insecticides in contact with natural enemies are favoured in IPM programmes</p> <p>5. Regulatory methods: Plant and animal quarantines by the government and collective eradication and suppression in large areas help in providing long-lasting management. International efforts to suppress noxious pests like locusts have proved fruitful.</p> <p><u>Biological control</u></p> <p>Biological control is the action of natural enemies (parasites, predators and pathogens) in maintaining another organism's population density at a lower level than would occur in their absence.</p> <p><u>Advantages and disadvantages of biological control</u></p> <p>Advantages:- It is a long-time self-perpetuating control of the target pest. Unlike insecticides, there is no fear of pest developing resistance. There is no fear of environmental pollution. In this method balance of nature in the ecosystem is not disturbed. This is a long-term control method and cost of controlling the pest is economical. There is no fear of pest resurgence, as normally happens by the application of insecticides.</p> <p>Disadvantages:- Biological control is a long-term process and takes years before natural enemies could be established and during this period the pest can cause immense damage. Often natural enemies fail to establish, leading to failure of the entire programme. In case of pest outbreak, biocontrol fails to provide immediate relief. In some cases a natural enemy also damages some useful animals or plants. Biocontrol doesn't provide surety. The projects usually have equal chances of failure or success.</p> <p><u>Biological control of pest includes</u></p> <p>a) Use of Predators : Control of woolly apple aphid, <i>Eriosoma lanigerum</i>, by <i>Aphelinus mali</i></p> <p>b) Use of Parasitoids</p> <p>c) Use of Pathogens: Control of sugarcane stem borers in some states of India by inundative releases of <i>Trichogramma minutum</i>, <i>T. japonicum</i> and <i>T. australicum</i>.</p>	
43	<p><u>BENEFITS OF FOOD PROCESSING (Any one)</u></p> <p>1) To reduce wastage and losses: Fruit and vegetable industry is the backbone of horticulture industry as it takes care of all possible waste that occurs in spite of improvement in the distribution and marketing of fresh produce.</p>	1+2+2=5

- 2) To handle glut: Produce during glut season utilized for making different processed products, thus fruit processing helps in reducing wastage and handling excess produce during glut season.
- 3) To stabilize farm prices and income: It stabilizes farm price by utilizing the excess produce in value addition to provide additional income to the farmers.
- 4) To utilize marketable surplus: Processing utilizes marketable surplus as well as cull and deformed produce, to ensure remunerative returns to the growers.
- 5) To generate employment: Processing of fruits and vegetables being a labour intensive helps to generate both direct and indirect employment for the masses.
- 6) To add variety to the diet: Value addition/processing make the food more attractive and palatable.
- 7) To ensure nutritional security.
- 8) To earn foreign exchange through export of processed fruit and vegetable products.

PROCESSING OF JAM (*Discussion of following points*)

- 1) **Selection of fruit:-** Fully ripe fruit should be harvested for Jam making. Jam is best fruit for Jam making. Pineapple, carrot, strawberry, banana, peach, pear also used for jam making.
- 2) **Washing/Cleaning of fruit:-** Fruit should be cleaned by clean water
- 3) **Preparation of Fruit:-** Fruit should be peeled and remove of core material for Jam making.
- 4) **Blanching**
- 5) **Cooking with Sugar:-** Fruit pulp start cooking with 1/3 quantity with sugar. After some time add remaining sugar
- 6) **Adding of Citric Acid:-** For enhancement of test citric acid should be added at 103°C temperature
- 7) **Judging of End-Point:-**
 - a) **Sheet or Flake test**
 - b) **Temperature:-** 105°C
 - c) **TSS:-** 68-70%
 - d) **Weight Test:-** If total weight of jam is 1.5 times more than sugar weight, jam is prepared.
- 8) **Packing:-** Jam should be filled in glass jar
- 9) **Storage:-** Jam should be stored at dry and cool place.

PROCESSING OF JELLY (*Discussion of following points*)

- 1) **Selection of fruit:**
- 2) **Washing/Cleaning of fruit:-** Fruit should be cleaned by clean water.
- 3) **Blanching:-**
- 4) **Extraction of fruit juice:-** For jelly making juice is excreted after blanching.
- 5) **Pectin Test:-**

	<p>a) Jelmeter test. b) Alcohol Test:-</p> <p>6) Cooking juice with sugar:- Start heating with 1/3 quantity with sugar. After some time add remaining sugar.</p> <p>7) Adding of Citric Acid:- For enhancement of taste citric acid should be added at 103oC temperature.</p> <p>8) Judging of End-Point:-</p> <p>a) Drop test:- A drop of the concentrated mass is poured into a glass containing water. Settling down of the drop without disintegration denotes the end-poin</p> <p>b) Temperature:- 105.50C</p> <p>c) TSS:- 65%</p> <p>d) Weight Test:- If total weight of jam is 1.5 time is more than sugar weight, jam is prepared</p> <p>9) Packing:- Jam should be fill in glass jar.</p> <p>10) Storage:- Jam should be stored at dry and cool place</p>	
44	<p>Methods of vermicomposting (Discussion on following points)</p> <p>1) Selection of site and bed preparation Shad is required for composting. Bed Size:- 40-50x3-4x3-4 fit</p> <p>2) Preparation of Vermicompost</p> <ul style="list-style-type: none"> ➤ Vermibed (vermes= earthworms; bed= bedding) is the actual layer of good moist loamy soil placed at the bottom, about 15 to 20 cm thick above a thin layer (5 cm) of broken bricks and coarse sand. ➤ Earthworms are introduced into the loamy soil, which the worms will inhabit as their home. 150 earthworms may be introduced into a compost pit of about 2m x 1m x 0.75m, with a vermibed of about 15 to 20 cm thick. ➤ Handful-lumps of fresh cattle dung are then placed at random over the vermibed. The compost pit is then layered to about 5 cm with dry leaves or preferably chopped hay/straw or agricultural waste biomass. For the next 30 days the pit is kept moist by watering it whenever necessary. ➤ The bed should neither be dry or soggy. The pit may then be covered with coconut or Palmyra leaves or an old jute (gunny) bag to discourage birds. ➤ Plastic sheets on the bed are to be avoided as they trap heat. After the first 30 days, wet organic waste of animal and/or plant origin from the kitchen or hotel or hostel or farm that has been pre-digested is spread over it to a thickness of about 5 cm. This can be repeated twice a week. ➤ All these organic wastes can be turned over or mixed periodically with a pickaxe or a spade ➤ Regular watering should be done to keep the right amount of moisture in the pits. If the weather is very dry it should be dampened 	5

	<p>periodically.</p> <p>3) Harvesting of Vermicompost</p> <ul style="list-style-type: none"> ➤ The compost is ready when the material is moderately loose and crumbly and the colour of the compost is dark brown. It will be black, granular, lightweight and humus-rich. ➤ In 60 to 90 days (depends up on the size of the pits) the compost should be ready as indicated by the presence of earthworm castings (vermicompost) on the top of the bed. Vermicompost can now be harvested from the bin/pit. ➤ To facilitate separating the worms from the compost, stop watering two to three days before emptying the beds. This will force about 80 per cent of the worms to the bottom of the bed. The worms can also be separated by using sieves/meshes. The earthworms and the thicker material, which remains on top of the sieve, goes back in the bin and the process starts again. The smell of the compost is earth-like. Any bad odour if formed is a sign that fermentation has not reached its final goal and that the bacterial processes are still going on. A musty smell indicates the presence of mold or overheating which leads to loss of nitrogen. If this happens, aerate the heap better or start again, adding more fibrous material and keeping the heap drier. The compost is then sieved before being packed. ➤ The harvested material should be placed in a heap in the sun so that most of the worms move down to the cool base of the heap ➤ In the two or four pit system, watering should be stopped in the first chamber so that worms will automatically move to another chamber where the required environment for the worms are maintained in a cyclic manner and harvesting can be done continuously in cycles. 	
45	<p>Present Status of organic farming (Any two)</p> <ul style="list-style-type: none"> a) Total area under organic certification in India is - 1.49 million ha b) Total Organic production in India - 1.35 Million tones c) The state with largest area under organic certification is – Madhya Pradesh> Himachal Pradesh> Rajasthan d) India’s First organic state- Sikkim (Declared on Jan 18,2016); Second organic state-Uttarakhan e) The country with largest area under organic farming– Australia (27.15 Mha f) The country with highest number of organic producers in the world :- India (More than 30 per cent of world’s organic producers are in India) g) India’s rank in terms of organically cultivated area is - 15th h) National Organic Farming Research Institute (NOFRI) in- Sikkim (February 2016) i) National Centre of Organic Farming, Ghaziabad, UP (2004) j) India’s First Organic farming University going to be set up in- Vadodara, 	2+2+1=5

	<p>Gujarath</p> <p>k) Largest exported organic product in India- Oilseeds (50%)> Processed food products>Cereals & millets> Tea>Pulses>Spices</p> <p>Importance of Organic Farming (Any two)</p> <ol style="list-style-type: none"> 1) Organic manures produce optimal condition in the soil for high yields and good quality crops 2) They supply the entire nutrient required by the plant (NPK, secondary and micronutrients) 3) They improve plant growth and physiological activities of plants. 4) They improve the soil physical properties such as granulation and good tilt, good giving good aeration easy rot penetration and improved water holding capacity. 5) They improve the soil chemical properties such as supply and retention of soil nutrient and promote favorable chemical reaction. 6) They reduce the need for purchased inputs. 7) Most of the organic manures are wastes of byproduct which accumulated load to pollution 8) Organic fertilizer are considered as complete palnt food 9) Organically grown crop are believed to provide more healthy and nationally superior food for man and animals that those grown with commercial fertilizers. 10) Organically grown plants are more resistant to disease and insect and hence only a few chemical sprays or other protective treatment are required. 11) There is an increasing consumer are willing to pay more for organic foods. 12) Organic farming helps to avoid chain reaction in the environment for chemical spray and dusts. 13) Organic farming helps to prevent environment degradation and can be used to regenerate degraded areas. 14. Since the basic aim is diversification of crops, much more secure income can be obtained that when they rely on only one crop or enterprise. <p>The Government of India is promoting organic farming through various schemes like</p> <ol style="list-style-type: none"> 1) National Project on Organic Farming 2) National Horticulture Mission 3) Rashtriya Krishi Vikas Yojna 4) National Food Security Mission promoting the use of Biofertilizer 5) ICAR Contribution in Promoting Organic Farming 	
46	<p>Post harvest management: Post Harvest Management includes the processes done immediately after harvesting the produce, including cooling, cleaning, sorting and packing. The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate. Therefore Postharvest treatments are given to increase its shelf life and maintain its quality. Thus post</p>	2+3=5

	<p>harvest management largely determines final quality.</p> <p><u>Post harvest management of mangoes</u></p> <p>Post-harvest losses can be minimized by adopting certain pre-harvest strategy and post-harvest management/technology. Principal pre-harvest strategy and post-harvest technology for reducing post-harvest losses are as under.</p> <p><u>(Discussion on following points)</u></p> <ul style="list-style-type: none">(i) Pre-harvest treatment;(ii) Proper curing(iii) Washing, cleaning and grading;(iv) Scientific packing(v) Pre-cooling(vi) Treatment: Vapor-heat treatment (VHT) is accepted quarantine treatment for export of Mangoes. Irradiation also done.(vii) Use of cold storage : Storage at 10 to 13 °C (50 to 55 °F) with 85 to 90% RH, give a shelf life of 14 to 28 days for mature green fruit, depending upon variety. Ripe fruits can be stored at 7 to 8 °C (44.6 to 46.4 °F). Mature green fruits can be stored at room temperature for about 4-10 days, depending upon variety.(viii) Suitable use of transport and(ix) Efficient marketing.	
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