PRACTICALE-MANUAL

Advances in Growth and development in Horticultural Crops- MSHC-302

(Course No.MSHC-302) Credits: 3(2-0-1)

M.Sc. Horticulture 3rd Semester Students

Dr. Ateeq Khan
Department of Horticulture,
School Agriculture Science, SGRR
University Patel Nagar Dehradun

Practical No.	Title
1.	Study of different growth stages in fruit crops
2.	Effect of plant growth regulators on flowering in mango
3.	Role of GA_3 on vegetative growth in tomato
4.	Measurement of leaf area index in horticultural crops
5.	Determination of crop growth rate and relative growth rate
6.	Study of fruit development stages in banana
7.	Effect of micronutrients on growth and yield in capsicum
8.	Techniques of pruning and training in grapes
9.	Use of mulching in vegetable production
10.	Role of drip irrigation in fruit crops
11.	Demonstration of tissue culture techniques in horticultural crops
12.	Effect of photoperiod and temperature on growth of vegetables
13.	Growth analysis using non-destructive methods
14.	Application of biofertilizers in horticultural crops
15.	Visit report to a hi-tech horticulture unit (Practical Record)

Practical 1: Study of different growth stages in fruit crops

Objective:
To study study of different growth stages in fruit crops.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 2: Effect of plant growth regulators on flowering in mango

Objective:
To study effect of plant growth regulators on flowering in mango.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 3: Role of GA_3 on vegetative growth in tomato

Objective:
To study role of ga_3 on vegetative growth in tomato.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 4: Measurement of leaf area index in horticultural crops

Objective:
To study measurement of leaf area index in horticultural crops.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 5: Determination of crop growth rate and relative growth rate

Objective:
To study determination of crop growth rate and relative growth rate.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 6: Study of fruit development stages in banana

Objective:
To study study of fruit development stages in banana.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 7: Effect of micronutrients on growth and yield in capsicum

Objective:
To study effect of micronutrients on growth and yield in capsicum.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 8: Techniques of pruning and training in grapes

Objective:
To study techniques of pruning and training in grapes.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 9: Use of mulching in vegetable production

Objective:
To study use of mulching in vegetable production.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 10: Role of drip irrigation in fruit crops

Objective:
To study role of drip irrigation in fruit crops.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 11: Demonstration of tissue culture techniques in horticultural crops

Objective:
To study demonstration of tissue culture techniques in horticultural crops.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 12: Effect of photoperiod and temperature on growth of vegetables

Objective:
To study effect of photoperiod and temperature on growth of vegetables.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 13: Growth analysis using non-destructive methods

Objective:
To study growth analysis using non-destructive methods.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 14: Application of biofertilizers in horticultural crops

Objective:
To study application of biofertilizers in horticultural crops.

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?

Practical 15: Visit report to a hi-tech horticulture unit (practical record)

Objective:
To study visit report to a hi-tech horticulture unit (practical record).

Theory:
Growth and development in horticultural crops are influenced by genetic, physiological, and environmental factors. Understanding these factors helps in improving productivity, quality, and management practices. This practical focuses on key physiological processes such as germination, vegetative growth, flowering, fruiting, and maturity in both fruit and vegetable crops. Application of growth regulators, nutrient management, and modern cultivation methods like mulching, fertigation, and protected cultivation enhance these stages effectively.

Materials Required:
Plant material, measuring instruments, growth regulators, fertilizers, notebook, etc.

Procedure:
1. Select uniform and healthy plants for experimentation.
2. Apply treatments as per design (growth regulators, nutrients, etc.).
3. Record observations at specific intervals.
4. Analyze data and summarize the findings.

Observation Table:

Treatment	Parameter 1	Parameter 2	Parameter 3

Result / Discussion:
Summarize the effect of treatments on plant growth and development. Discuss which treatment performed best and relate results with theoretical principles.

Precautions:
1. Handle chemicals and growth regulators carefully.
2. Maintain uniform environmental conditions.
3. Record data accurately and systematically.
4. Avoid contamination during laboratory work.

Viva Questions:
1. Define plant growth and development.
2. What are the major stages of growth in horticultural crops?
3. Explain the role of plant growth regulators.
4. What are the factors affecting fruit development?