

STUDYING FRUIT SETTING AND FRUIT DROPPING IN IMPORTANT FRUIT CROPS

Exercise

Studying fruit setting and fruit dropping in important fruit crops.

Objectives

- To know about fruit setting and fruit drop in important fruit crops in the locality.
- To know about causes of fruit drops fruit crops in the locality.
- To know about the pattern of fruit drop fruit crops in the locality.

Delivery schedule: 02 periods

Student expectations/learning objectives

- To know about factors responsible for fruit set.
- To know the causes of fruit drop in important fruit crops.

Handouts/material/equipment's & tools required: Practical note book, pen and pencil, to note down the important points on fruit set and drop in fruit crops. Aluminum/ paper tags and Vernier Caliper, magnifying lens, small portable balance to measure size and weight of dropped fruits.

Pre-learning required: Pre-requisite knowledge about pollination, fertilization fruit growth and development processes in important fruit crops.

Introduction

There may be plenty of flowers on your plants, but you're not getting any fruit. What's going on? The flowers have not been pollinated properly. They have either not been pollinated at all, have been pollinated under the wrong conditions, or pollination has been insufficient. Fruit set may be explained as the initiation of process of formation of fruit from the flower tissues after successful pollination and fertilization. However, in certain cases fertilization is not necessary due to parthenocarpic fruits are formed. In general, it is observed that fruit trees flowers profusely and set fruits, but the ultimate retention of mature fruits is very low. This primarily happens due to drop of flowers and fruits at different developmental stages. Fruit drop is a common problem of majority of fruit species, but it is very high in fruit crops like mango, citrus, apple, pear, sapota, coconut and stone fruits. For example, there are 1000 to 6000 flowers per panicle in mango, but less than 0.1 per cent reaches maturity. Scientists are of opinion that 0.1 per cent fruit set in mango, 4-5 per cent in citrus and 3-4 per cent in temperate fruits is sufficient to bear a normal crop. It means about 95-99 per cent flowers either do not set fruits, and if they set, the fruit drop off in subsequent stages of their development. Fruit drop at initial stage of development is considered as a necessary evil because it saves the tree from exhaustion. Whereas, fruit drop in later part of fruit development has negative effect on fruit yield from the tree. It is therefore necessary for the students to know

about fruit set and fruit drop in the trees available in their locality. Furthermore, the knowledge about waves of fruit drop and causes of fruit drop is equally important.

Waves of fruit drop

Fruit drop occurs at different stage of fruit development and in series of waves. The number of waves varies with the fruit species and climatic conditions prevailing in the locality. There are certain disagreements among pomologists about waves of fruit drop in different fruit crops. However, based on fruit size, intensity and economic loss the fruit drop has been categorised in three waves.

1. **Pin-head drop:** This wave mainly consists of drop of abnormal, shrivelled floral organ and unpollinated flowers. This drop also includes small pin-head like fruits. It occurs shortly after fruit set and usually lasts for a month following full bloom. This fruit drop is sometimes considered desirable if the initial fruit set is excessive.
2. **Post-set drop:** In this phase, the fruit drop off after they have set. It consist of drop of the fruits having diameter between 4 mm to 16 mm. The drop of fruits is variable in different cultivars, but differences are small. Post-set drop is considered as major drop in mango and many other fruits. The drop becomes prominent in mid-April in mango.
3. **May drop:** From economic point of view, may drop is most important because it consist of drop of fully mature fruits just before harvesting. It continues upto May and sometimes in June also in mango. It is also called as pre-harvest drop in many fruit trees.

For teachers...

- Explain to students the pollination and fertilization processes in fruit crops.
- Make students to understand parthenocarpic fruit development.
- Practically show tagging and thinning of flowers for observing fruit set or drop.

Causes of fruit drop



Normal fruit set in mango



A view of pre-harvest drop in mango

- Genetic factors
- Climatic factors
 - * Extremes of temperature
 - * Low humidity
 - * High wind velocity
 - * Storm, hail etc.
- Pathological factors
 - * Fungal diseases
 - * Bacterial diseases
 - * Viral diseases
 - * Nematodes
- Entomological factors
 - * Infestation of insects and pests
- Physiological factors
 - * Defective flower
 - * Embryo abortion
 - * Disturbed water relations
 - * Malnutrition
 - * Lack of pollinizer and pollinators
 - * Poor pollen transfer
 - * Hormone imbalance



Powdery mildew disease on mango panicle



Mealy bug infestation on mango

Procedure to observe fruit set and drop in fruit trees (example-mango)

Steps

1. Tag ten panicles in different directions north, south, east and west of mango tree.
2. Thin flowers and retain definite number of hermaphrodite (bisexual) flowers per panicle.
3. Count number of flowers showing sign of fruit set (Initial fruit set).
4. Count number of fruits retained at weekly interval.

How to calculate fruit set and drop in fruit trees

$$\text{a. Fruit set (\%)} = \frac{\text{Final Fruit Number}}{\text{Initial Fruit Number}} \times 100$$

$$\text{b. Fruit drop (\%)} = \frac{100 - \text{Final Fruit Number}}{\text{Initial Fruit Number}} \times 100$$

$$\text{c. Rate of fruit drop (Q)} = \frac{\log X_1 - \log X_2}{t_1 t_2}$$

Where,

X_1 = number of fruits at time t_1

X_2 = number of fruits at time t_2

Students Activities

1. Visit some fruit orchards in your locality during flowering and fruiting seasons and observe fruit set and retention at an interval.
2. Calculate fruit set percentage, fruit drop percentage and rate of fruit drop from the following table using above formula.

Fruit	Number of fruits (Initial fruit set)	Number of fruits at intervals (week)				
		1	2	3	4	5
Mango	100	75	31	15	11	10
Citrus	100	85	45	29	22	20
Guava	100	77	40	33	22	20
Sapota	100	62	30	22	18	17
Coconut	100	44	28	16	13	12

Results

a. Fruit set (%)

Fruit	Fruit set (%)				
	1	2	3	4	5
Mango					
Citrus					
Guava					
Sapota					
Coconut					

b. Fruit drop (%)

Fruit	Fruit drop (%)				
	1	2	3	4	5
Mango					
Citrus					
Guava					
Sapota					
Coconut					

c. Rate of fruit drop

Fruit	Rate of fruit drop				
	1	2	3	4	5
Mango					
Citrus					
Guava					
Sapota					
Coconut					

Study Material

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- Chattopadhyay, T. K. (2008). A textbook on Pomology, Vol. 4 (Sub-tropical fruits), Kalyani publishers, Ludhiana, India.,
- Chadha, K. L. (1993). Fruit drop in mango. In: Advances in Horticulture Vol. 2- Fruit Crops, Eds. K. L. Chadha and O. P. Pareek, Malhotra Publishing House, New Delhi
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