



# Oat Floral Biology and Factors Affecting Seed Set

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## ABSTRACT

In India, oat is grown as fodder crop during *Rabi* season in north-western and central parts of the country and is now even extending to eastern region as well. The only commercially cultivated species in the genus *Avena* are *Avena sativa*, *Avena nuda* and *Avena byzantine*. Oat flowers are bit delicate when compared to other cereal floral structure and seed set is influenced by many factors during artificial hybridisation. This paper includes about floral biology of oat crop and also the various factors responsible for seed set during hybridisation viz effect of Interval Between Emasculation and Pollination, effect of temperature for seed set and any injury to floral Parts during hybridisation.

**Key words:** Emasculation, Floral biology, Hybridisation, Oat, Seed set.

## INTRODUCTION

The oat (*Avena sativa* L.) is a winter cereal crop native to the Mediterranean region, belonging to the genus *Avena* and the family gramineae (Poaceae). It's a self-pollinated crop with a limited range of diversity (Rana *et al* 2019). The only commercially cultivated species in the genus *Avena* are *Avena sativa*, *A. nuda* and *A. byzantine*. After wheat, maize, sorghum, rice and barley, oats come in sixth in terms of production. In India, oat is grown as fodder crop during *Rabi* season in north-western and central parts of the country and is now even extending to eastern region as well. In Punjab, oat is cultivated as a fodder crop on 0.98 lac hectare with annual production of 36.6 lac ton.

### Floral biology

The flower are enclosed in a scales or bracts and grouped in a characteristic structures are called spikelet. Spikelet of oat are arranged in a panicle. Each spikelet has a small joints axis or rachilla which bears floret. Within the spikelet the floret are present. Floret may vary from 2 to 3. When it consist of 3 florets, it may consist of a) opened primary floret b) unopened secondary floret c) rudimentary tertiary floret. Blooming begins in the upper floret. Oats has an incomplete flowers because it lacks sepals and petals (MISONOO *et al.*, 1936).

### Effect of temperature for seed set during hybridisation

The number, form and age of florets, emasculation and pollination time of day, stigma receptivity, pollen condition and environmental factors all play a role in the success of small grain crossing. Low field temperatures will help in seed set, while high temperatures will hinder seed set. High temperatures between emasculation and pollination reduces seed set. More top florets set seed when the period between emasculation and pollination is shorter, whereas more lower florets set seed when the interval is longer. Most certainly, stigma receptivity played a role. On the day of the

emasculation, only 3 or 4 of the uppermost stigmas need to be emasculated. On hot days, simply opening and closing florets to extract one anther results in a 30 to 50% reduction in the amount of anther extracted. (Brown *et al.*, 1956).

### Time of pollen collection and emasculation

Pollen content was often blamed for seed set failures. Immaturity seems to be the primary cause of low efficiency. To make crosses, only mature anthers with dusty pollen should be used. Pollen seems to be at its best just before natural anthesis. On some days, suitable pollen is only available for an hour, but on others, it is available for many days. Pollination preceded emasculation on the same day, or when emasculation and pollination were separated by more than 2-3 days, there will be less seed set. At low temperatures, stigmas remained more receptive than at high temperatures.

### Effect of interval between emasculation and pollination

When there is a 2-day interval between emasculation and pollination, the percentage seed set will be fine and when there is a 1- or 3-day interval, the percentage seed set will be slightly lower. Pollinations performed on the day of emasculation were less successful, but some decent results were obtained. If 4 or more days passed between emasculation and pollination, seed sets were lower.

### Injury and exposure of flower parts

Is one of the main factor for seed set during hybridisation. The proper care to be taken due to delicate nature of floral parts in oat., so that no injury happens to the flower.

### Scientists worked on oat factors influencing seed set

Natural anthesis in oats reached its peak in the field between 3 and 4 p.m., according to Coffman. Anthesis normally started around 3:30 p.m., according to Hadden. Natural anthesis was postponed until the temperature fell in the late afternoon, according to Coffman and Stevens. Coffman and



**Fig 1:** Flag leaf stage.



**Fig 2:** Spikelet.



**Fig 3:** Floral structure.



**Fig 4:** Bifid stigma.



**Fig 5:** Anthers.

Hadden reported that natural anthesis was the most successful perinatal period. Misonoo reported that temperature variation was the initiating factor in natural blooming of oats. And also noted that in the greenhouse oat flowers bloomed in order as the panicle emerged from the sheath.

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