# Effect of weather parameters and plant geometry on sucking dynamics in Bt and Non Bt cotton

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Objectives:

- ✓To study the effect of different spacings on sucking pest dynamics in Bt and Non Bt cotton
- ✓To find out the relationships between insect population and weather parameters

# Methodology

A field experiment was conducted at PAU, Regional Research Station, Bathinda (Latitude 30°17'N; Longitude 74° 58'E and altitude of 211 meters amsl) during the *kharif* season of 2005-06 to study the effect of weather parameter and spacing on sucking pests of Bt cotton. The experiment comprised of *Bt* and non-*Bt* hybrids of RCH -134 cultivar of cotton sown under three plant geometry i.e 67.5x75cm, 67.5x90cm and 67.5x105cm. The experiment was laid out in randomized block design and replicated thrice. Recommended package of practices were followed for different operations during the growing period. The population of three sucking pests i.e. whitefly, *jassid* and *thrips* was observed at weekly interval as per the standard procedure. The weather parameters were observed in the Agromet observatory neat the experimental area . The stepwise regression analysis was carried out to examine the relationship between insect pest population and weather parameters.

# Results

**Table 1. Effect of spacing on white fly infestation in Bt cotton during the growing period**

| Dates of observation | Mean population / 3 leaves in BT otton | | | | Mean population / 3 leaves in Non Bt cotton | | | |
|---|---|---|---|---|---|---|---|---|
| | 67.5X75 | 67.5X90 | 67.5X105 | Mean | 67.5X75 | 67.5X90 | 67.5X105 | Mean |
| 22/7/05 | 0.40 | 1.30 | 0.50 | **0.73** | 0.40 | 0.10 | 0.30 | **0.27** |
| 29/7/05 | 0.50 | 1.20 | 1.10 | **0.93** | 0.80 | 0.20 | 0.50 | **0.50** |
| 05/8/05 | 0.30 | 0.70 | 0.70 | **0.57** | 0.40 | 1.30 | 0.90 | **0.87** |
| 11/8/05 | 1.10 | 0.80 | 1.50 | **1.13** | 0.50 | 0.90 | 0.40 | **0.60** |
| 17/8/05 | 0.50 | 0.60 | 0.70 | **0.60** | 0.70 | 0.70 | 1.02 | **0.80** |
| 26/8/05 | 1.70 | 0.90 | 1.90 | **1.50** | 1.40 | 0.60 | 1.00 | **1.00** |
| 02/9/05 | 2.10 | 2.20 | 1.90 | **2. 07** | 1.80 | 0.90 | 1.40 | **1.37** |
| 15/9/05 | **2.70** | **2.90** | **4.20** | **3.27** | 3.60 | 2.90 | 3.50 | **3.33** |
| 04/10/05 | 2.60 | 2.20 | 3.60 | **2.80** | 3.20 | 2.90 | 3.80 | **3.30** |
| **Mean** | **1.32** | **1.40** | **1.79** | | **1.42** | **1.17** | **1.42** | **---** |

**Table 2. Effect of spacing on *jassid* infestation in Bt cotton during the growing period**

| Dates of observation | Mean population / 3 leaves in BT otton | | | | Mean population / 3 leaves in Non Bt cotton | | | |
|---|---|---|---|---|---|---|---|---|
| | 67.5X75 | 67.5X90 | 67.5X105 | Mean | 67.5X75 | 67.5X90 | 67.5X105 | Mean |
| 22/7/05 | 0.8 | 0.6 | 0.4 | **0.60** | 0.2 | 0.9 | 0.5 | **0.53** |
| 29/7/05 | 1.1 | 0.5 | 0.6 | **0.73** | 0.4 | 0.4 | 0.6 | **0.47** |
| 05/8/05 | 4.4 | 4.7 | 2.3 | **3.80** | 2.5 | 1.9 | 3.0 | **2.47** |
| 11/8/05 | 3.6 | 3.1 | 3.2 | **3.30** | 3.6 | 2.9 | 3.2 | **3.23** |
| 17/8/05 | 3.8 | 3.3 | 3.0 | **3.37** | 2.4 | 3.8 | 3.2 | **3.13** |
| 26/8/05 | 2.5 | 2.1 | 2.3 | **2.30** | 2.2 | 0.8 | 1.6 | **1.53** |
| 02/9/05 | 3.3 | 2.7 | 2.8 | **2.93** | 2.2 | 0.7 | 2.1 | **1.36** |
| 15/9/05 | 2.8 | 2.9 | 3.6 | **3.10** | 2.4 | 2.0 | 1.6 | **2.30** |
| 04/10/05 | 0.0 | 0.0 | 0.0 | **0.00** | 0.0 | 0.0 | 0.5 | **0.17** |
| **Mean** | **2.48** | **2.21** | **2.02** | | **1.77** | **1.49** | **1.81** | |

**Table 3 Effect of spacing on *Thrips* infestation in Bt cotton during the growing period**

| Dates of observation | Mean population / 3 leaves in BT otton | | | | Mean population / 3 leaves in Non Bt cotton | | | |
|---|---|---|---|---|---|---|---|---|
| | 67.5X75 | 67.5X90 | 67.5X105 | Mean | 67.5X75 | 67.5X90 | 67.5X105 | Mean |
| 22/7/05 | 1.60 | 3.20 | 5.00 | **3.27** | 4.20 | 3.10 | 4.60 | **3.97** |
| 29/7/05 | 2.60 | 2.30 | 2.70 | **2.87** | 2.70 | 4.30 | 3.00 | **3.33** |
| 05/8/05 | 0.70 | 2.60 | 0.70 | **1.33** | 3.70 | 1.80 | 2.10 | **2.53** |
| 11/8/05 | 2.30 | 4.50 | 4.90 | **3.90** | 3.40 | 4.40 | 2.90 | **3.57** |
| 17/8/05 | 0.80 | 1.30 | 1.60 | **3.70** | 1.40 | 3.60 | 3.00 | **2.63** |
| 26/8/05 | 6.40 | 5.00 | 6.70 | **6.07** | 2.20 | 2.40 | 3.60 | **2.73** |
| 02/9/05 | 2.20 | 2.20 | 2.60 | **1.67** | 2.20 | 1.50 | 1.40 | **1.70** |
| 15/9/05 | 1.30 | 0.40 | 1.30 | **1.00** | 0.04 | 1.50 | 1.60 | **1.17** |
| 04/10/05 | 0.00 | 0.00 | 0.00 | **0.00** | 0.00 | 0.00 | 1.50 | **0.50** |
| **Mean** | **1.99** | **2.50** | **2.85** | **Mean** | **2.24** | **2.51** | **2.63** | |

**Table 4. Weather parameters recorded during the crop growing season**

| Dates of observation | Maximum temperature (°C) | Minimum temperature (°C) | Morning relative humidity (%) | Evening relative humidity (%) | Number of Rainy days |
|---|---|---|---|---|---|
| 22/7/05 | 36.3 | 24.3 | 66 | 45 | 0 |
| 29/7/05 | 38.3 | 28.3 | 75 | 46 | 0 |
| 05/8/05 | 30.3 | 23.7 | 85 | 89 | 2 |
| 11/8/05 | 34.5 | 28.7 | 82 | 62 | 1 |
| 17/8/05 | 37.2 | 26.4 | 82 | 51 | 0 |
| 26/8/05 | 31.2 | 25.3 | 87 | 60 | 0 |
| 02/9/05 | 35.4 | 26.3 | 65 | 57 | 0 |
| 15/9/05 | 36.2 | 25.2 | 69 | 37 | 0 |
| 04/10/05 | 28.8 | 23.2 | 82 | 85 | 1 |

# Regression Analysis

White Fly in Bt cotton:

Y=5.23-0.03Tmax-0.11Tmin (r=0.27)

Y=23.37-0.49Tmax+0.16Tmin-0.07Rh (r=0.73)

White fly in Non Bt cotton:

Y=8.67-0.04Tmax-0.23Tmin (r=0.46)

Y=21.07-0.36Tmax-0.06Tmin-0.04Rhm-0.04Rhe (r=0.60)

Y=21.93-0.37Tmax-0.06Tmin-0.04Rhm-0.04Rhe+0.17RD (r=0.61)

Tmax-Maximum temperature, Tmin -Minimum temperature, Rhm- morning humidity, Rhe –evening relative humidity and RD is number of rainy days

Jassid in Bt cotton:

Y=-1.67-0.06Tmax-0.23Tmin (r=0.25)

Y=-8.89+0.13Tmax+0.09Tmin-0.04Rhe+0.1Rhe (r=0.32)

Y=-1.17-0.01Tmax+0.09Tmin+0.04Rhm-0.06Rhe+1.52RD (r=0.50

Jassid in Non Bt cotton:

Y=-3.2-0.05Tmax-0.26Tmin (r=0.35)

Y=-11.6-0.16Tmax+0.06Tmin+0.08Rhm+0.01Rhe (r=0.53)

Y=-4.26+0.05Tmax+0.07Tmin+0.07Rhm-0.06Rhe+1.45RD (r=0.69)

Tmax-Maximum temperature, Tmin -Minimum temperature, Rhm- morning humidity, Rhe –evening relative humidity and RD is number of rainy days

Thrips in Bt cotton:

Y=-7.85-0.07Tmax+0.49Tmin (r=0.45)

Y=-2.21-0.23Tmax+0.28Tmin+0.15Rhm (r=0.75)

Y=-7.37-0.15Tmax+0.28Tmin+0.15Rhm-0.05Rhe-1.02RD (r=0.77)

Thrips in Non Bt cotton:

Y=-5.38+0.08Tmax+0.20Tmin (r=0.51)

Y=-11.97+0.25Tmax+0.07Tmin+0.05Rhm+0.01Rhe (r=0.57)

Y=-8.89+0.20Tmax+0.07Tmin+0.04Rhm-0.02Rhe+0.61RD (r=0.61)

Tmax-Maximum temperature, Tmin -Minimum temperature, Rhm- morning humidity, Rhe –evening relative humidity and RD is number of rainy days

Conclusions:

- No significant difference was observed between Bt and Non Bt cotton w.r.t. pest population.
- No particular trend was observed in the white fly and thrips infestation with plant geometry however closer spacing was found to favor the jassid build up in both the Bt and non - Bt cotton
- Based on the regression analysis, it was found that the relative humidity of morning and evening favored the sucking pest infestation in both Bt and None Bt cotton.


Thank you