

R. K. SWAIN
SECRETARY



D. O. No. B-14-26/98/14-2

Government Of Madhya Pradesh
Agriculture & Cooperation
Department

Mantraiaaya, Vallabh Bhawan
Bhopal - 462004

BHOPAL, Date 08-12-2005

Dear Shri Bhat,

Please refer to your letter No.9-9/2005-SD-V dated 22nd
Nov.2005. As desired, the report on performance of Bt.Cotton
in Madhya Pradesh is being enclosed herewith for your
information and necessary action.

With Regards,

Yours Sincerely,

(R.K.Swain)

Shri S.L.Bhat,
Joint Secretary,
Government of India,
Ministry of Agriculture,
(Department of Agriculture & Co.operation)
Krishi Bhavan
New Delhi

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Government of Madhya Pradesh
Department of Agriculture

A brief note on the performance of Bt.Cotton with reference to
complaints received and news published in various news papers

In the year 2005-06 about 6.35 lacs hectares has been covered under cotton cultivation in Madhya Pradesh, out of which commercial cultivation of Bt.cotton has been undertaken in approximately 1.34 lacs hectares. Commercial cultivation of Bt.cotton started in Madhya Pradesh from the year 2002-03 after getting the requisite sanction from the "Genetic Engineering Approval Committee (GEAC) of Ministry of Invoirement and Forest, Government of India, Since then the area under Bt.Cotton cultivation has been steadily increasing in Madhya Pradesh as is evident from the data given below:-

<u>Year</u>	<u>Area under Bt.cotton cultivation.</u>
2002 - 03	- 1470 hect.
2003 - 04	- 12864 hect.
2004 - 05	- 85739 hect.

2. After obtaining the approval of Government of India, Government of Madhya Pradesh had allowed the following 4 seed distribution companies, namely, Mahyco, Rassi, Ankur & Nuzzibudu to sell 12 varieties of Hybrid Bt.cotton seed in Madhya Pradesh under the prescribed terms and conditions.

3. It has been observed that the cost of cultivation of Hybrid Bt.cotton comes to nearly Rupees 22-25,000 per hectare, whereas the same for Hybrid Non Bt.cotton comes to Rupees 18-20,000 per hectare. Bt. cotton is marked by higher productivity of 20-25 quintals per hectare, whereas hybrid non Bt.cotton has comparatively productivity, i.e. 18-20 quintals per hectare. It has been found that the attack of Boll worm insect is rare in case of hybrid Bt.cotton which substantially brings down the cost incurred on pesticides. As a result of this, the farmers practicing Hybrid Bt.cotton, earn a profit of nearly 5000 rupees per hectare more than the farmers cultivations the non Bt.cotton under normal circumstances.

4. After receiving information that large scale wilting of Bt.cotton plants have taken place in the State during the current year, four fact finding teams headed by Principal Agricultural Scientists were constituted by Agriculture Department. The team of Scientists visited and inspected the standing cotton crops in all the 11 districts where Bt. cotton is cultivated. As per the reports received from the teams, wilting of hybrid Bt.cotton was found to have occurred only in Nisarpur block of Dhar district & patty block of Barwani district. The visiting scientists did not find any such problem in the remaining 9 districts. A copy of the joint report submitted by the team is enclosed as annex.- I. Following are the important findings of the report:-

(a) The wilting in Bt.cotton was observed only in the Patti block in Dist. Barwani & Nisarpur block of Distt. Dhar. This phenomenon has been identified as "New Wilt" which is a Physiological disorder supposed to have occurred due to the change in the Agro climatic conditions.

(b) Bt. cotton was found to be more susceptible to New Wilt in comparision to non Bt.cotton.

(c) The occurrence of "New Wilt" was found to be more in cases of summer sowing as compared to cases of sowing after the un-set of monsoon.

(d) In patty and Nisarpur blocks, the phenomenon of New Wilt was found to be more severe due to two main factors namely, (i) the occurrence light and shallow soil in these blocks and (ii) less than average rainfall which was aggravated by long dry spells of 10-22 days during the month of August.

(e) The seed supply companies neither imparted the necessary training to the farmers, nor did they educate the cotton growers regarding the package of practices to be adopted.

(f) No complaint regarding allergic reactions in human beings or death of livestock due to cultivation of Bt.cotton was received from the farmers in any of the districts.

5- Action taken by the Deptt. -

- (i) The Director of Agriculture, in his sanction order has made it compulsory that the farmers should plant five rows of non Bt.cotton plants(the area of which shall not be less than 20 percent of the cultivated area) around the Bt.cotton field. District level and State level committees were formed to monitor the implementation of terms and conditions. Besides, divisional and district level teams consisting of officers of Agricultural Department & Agricultural Scientist were constituted for random inspection and evaluation.
- (ii) Drip and sprinkler facilities were provided under subsidy scheme available under Cotton Technology Mini Mission -II. Upto the year 2004-05, sprinkler irrigation was provided in 2670 hectares and drip irrigation, in 476 hectares. In addition to the Cotton Technolgy Mini Mission II, Sprinkler irrigation was provided for 50796 hect. under the ISOPAM and Macro management schemes
- (iii) The hybrid Bt. cotton seed is neither certified nor notified under the Seed Act. Therefore, under the advice of Government of India, testing kits were provided to the Senior Agricultural Development officers to test the quality of Bt.cotton seeds so that spurious seeds are not sold to the farmers. They were asked to allow the distribution of the seed only after ensuring the quality of each lot.
- (iv) During the 9th five year plan under NWDPR 51443 sunken ponds and 178 nos of percolation tanks were built in the State to augment the ground water. Similarly, under Micro Minor scheme and Augmentation of Ground Water scheme, 1467 nos of percolation tanks were built in the State to recharge the ground water.

6-Recommendation :-

After the perusal of the reports submitted by the Scientists and on the basis of the discussions held with them, the following action points have been identified for the approval of the State Government :-

(a) The summer sowing of the Bt.cotton should be discouraged and the farmers should be given advice not to undertake cultivation of Bt.cotton in light and shallow soil.

(b) The farmers should also be given advice for cultivation of Bt.cotton only at places where assured life saving irrigation is available.

(c) It should be mandatory for the seed companies to arrange minimum three training programmes for the farmers at the Gram Panchayat level. The first training programme should be organised before the sowing of seed (i.e.during the month of April & May). The second training programme should be organised during the month of July & August to assess the moisture availability & to find out ways and means to combat the effect of dry spell, if any. The third training programme should be organised during the flowering & boll formation stage (i.e. during the month of Aug-Sept.)

(d) A training calendar should be prepared by the Director of Agriculture in consultation with the Scientist of the State Agricultural University. The same shall be circulated to the seed companies and the respective Deputy Directors of Agriculture and its implementation should be monitored on month to month basis.

(e) It shall be mandatory for the suppliers of Bt.cotton seed to make available the package of practices as recommended and developed by the scientist of the State Agricultural University to the farmers at the time of sell of seed.

(f) The Bt.cotton seed packets should be printed with the following label/prescription "Bt.cotton should not be cultivated in light & shallow soil and without assured irrigation."

(Dr.D.N.Sharma)
Deputy Secretary to
Government of Madhya Pradesh
Department of Agriculture

SUMMARY OF THE REPORTS OF THE FOUR TEAMS SENT FOR INVESTIGATING THE SUDDEN DRYING IN Bt COTTON

Background:

Genetically modified cotton (Bt Cotton) was introduced for commercial cultivation in Madhya Pradesh in 2002-03 cropping season. In the first year, the area under Bt cotton was approximately 1470 ha.. Since then, the area under transgenic hybrids of cotton has been increasing at a fast pace. During the current season, the area under Bt cotton is 1.34 lakh ha.

The quantum jump in the area is indicative of the increasing popularity and demand of the farmers of the state . However, of late reports are trickling in , of the discontent among the farmers particularly in respect of the problem of sudden drying of Bt cotton from various parts of the state. Serious concerns about Bt cotton have been raised through Newspapers also ((Hindustan Times dated 22.11.05; The Hindu, Delhi dated 16.11.05; Dainik Hindustan, Delhi dated 16.11.05; Jansatta, Delhi dated 16.11.05). Shri Mohanlal Patidar, President, Krishi Upaj Mandi Samiti, Kukshi, Distt. Dhar had also complained to the Honorable Chief Minister on 06.10.05 (Report of the Public hearing organised on 23.10.05 in Krishi Upaj Mandi, Kukshi) and Dainik Bhaskar dated 9.11.05.

The Government of Madhya Pradesh has obtained the regular survey reports of the last three seasons. The Maharashtra Government has been conducting regular surveys to evaluate the performance of Bt hybrids. The survey conducted in 2002-03 has revealed that the No. of suares and the number of bolls were more as compared to Non-Bt hybrids. There were many complaints about wilting from Amravati, Yeotmal and Nanded districts. There were long dry spells followed by heavy showers when the plants started wilting. During the survey conducted in 2003-04, they have recorded that in Bt hybrids, the first flush of bolls was retained as compared to refuge plants and Non-Bt hybrids. In 2004-05, reports of wilting were received from a few places. The scientists from the Central Institute for Cotton Research (ICAR), Nagpur have exmined these cases and are of the opinion that it is not a pathogenic wilt but a physiological disorder (Parawilt). The Officers of the Stae Govt. of Maharashtra have given a feed back to the Government that the Bt cotton hybrids are susceptible to wilt. The Government of Andhra Pradesh has also been requested to provide a copy of their report on Bt hybrids in their state.

The Government of Madhya Pradesh has taken a serious note of the complaints against Bt cotton and the Secretary (Agriculture) issued directives on 22/23.11.05 vide No.B-14/01/2005/14-2 for undertaking extensive surveys and understand the problem of sudden drying of Bt cotton. Four teams were constituted to survey the entire cotton growing tract of Madhya Pradesh. Each team had three scientists and a coordinator of the rank of Zonal Manager of the Department of

Agriculture. The teams were led by very senior scientists of JNKVV, Jabalpur. The scientists were drawn from various disciplines viz. Plant Breeding, Plant Pathology, Plant Physiology and Entomology. Each team was directed to visit the districts assigned to them, study the sudden drying in Bt cotton (if any), meet public representatives and discuss the problem with them. They were also directed to seek the opinion of the respective District Collector. The details of the districts assigned to each team is as under :

1. Team-1: Led by Dr. P.K.Mishra, Principal Scientist (Cotton), Main Cotton Research Station, JNKVV, Khandwa. Assigned districts – Harda, Dewas, Khandwa and Burhanpur.
2. Team-2: Led by Dr. Ashok Krishna, Principal Scientist (Plant Pathology), College of Agriculture, Indore. Assigned districts : Khargone and Barwani.
3. Team-3: Led by Dr. P.P. Shastri, Senior Scientist (Cotton Pathology), Main Cotton Research Station, JNKVV, Khandwa. Assigned districts – Dhar, Jhabua, Ratlam and Ujjain.
4. Team-4: Led by Dr. S.R. Dharpure, Associate Director of Research and Principal Scientist (Entomology), JNKVV, Chhindwara. Assigned districts : Chhindwara.

*It is due to
summer sowing
varieties with*

*Few places / RCH-2 2%
Bt 1745 Mallika 15-20%*

The teams were asked to submit their reports to the Secretary (Agriculture) by 30.11.05. The salient findings of the team are given below :

The survey was done examining the fields of Bt and Non-Bt cotton in 118 villages across 11 cotton growing districts of the state. Sporadic incidences of sudden drying of Bt cotton was observed only in Nisarpur block of Dhar district and Pati block of Barwani district.

Jhabua district only one field was found to be affected by this malady. The problem of sudden drying of Bt Cotton was found only in two fields of Saunsar block of Chhindwara district. In one field of RCH-2(Bt) the wilting was only around 2% while in the other field the wilting was observed to be in the range of 15-20 % on the Bt hybrid Mallika. In the rest of the cotton tract the crop of Bt cotton is healthy and there is no problem of sudden drying.

The team of scientists have made the following important observations in respect of sudden drying in Bt cotton fields :

1. In the majority of the affected cases, sowing of Bt Hybrids was done in summer.
2. It was invariably observed that the affected fields soils were light and shallow.

3. The affected plants were randomly distributed.
4. The total rainfall in Nisarpur Block was only 267 mm against an average of 534 mm of the district indicating a status of moisture stress. Similarly, in Pati block also the total rainfall has been less (434 mm) as compared to the average rainfall received in Barwani district. (625 mm)
5. The initiation of the sudden drying was observed by the farmers in mid-September when the crop was in peak bolling stage.
6. There was a long dry spell of 22 days (13.8.05 to 03.09.05) in Nisarpur block of Dhar district. Similarly the crop experienced a two dry spells of 10 days & 16 days (04.08.05 to 14.08.05 ; 18.8.05 to 02.09.05) in Pati block during peak bolling stage.
7. The symptoms of the malady as described by the farmer are : discolouration of leaves, sudden drooping, defoliation and wilting of the plants.
8. The incidence of bollworms was more in Non-Bt as compared to Bt crop.
9. As per the information provided by the farmers, square shedding was more in healthy and refugia plants (wherever sown) as compared to plants affected by sudden drying.
10. In a number of cases, refugia was not sown which is in violation of the conditions set by the Govt. of M.P. for commercial cultivation of these hybrids.
- 11 11. The number of open bolls was significantly higher in affected plants as compared to healthy plants.
- 11 12. The farmers said that they were not educated by the seed companies through trainings on the package of practices.
13. Most of the farmers were not aware of the package of practices.
14. The representatives of seed companies did not visit their fields even after repeated complaints.
15. The soils in general in the villages visited by the team were light and shallow.
16. In some cases it was observed that the affected plants have revived.
17. On an average in both the blocks (Nisarpur and Pati), the farmers of the affected fields have realised a seed cotton yield of 4-6 quintals/ acre.

These observations, indicate that the sudden drying in Bt hybrids is due to a malady known as ' New Wilt' which is a physiological disorder expressed under the strong influence of the environment.

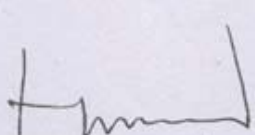
The symptoms as described by the farmers are indicative of the plant undergoing moisture stress. Since, the soils are light and shallow , the moisture retention is expected to be low. Further, in Bt hybrids due to higher retention of bolls during the phase of moisture stress as indicated by the higher number of

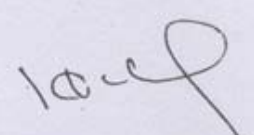
open bolls, the stress is aggravated further. A long dry spell was encountered during the bolling stage of the crop. The Bt plants with high boll number are unable to sustain the stress and succumb. On the contrary, the comparatively higher square shedding and retention of less bolls in Non Bt plants (including Refugia- Non Bt counterpart of the same hybrid), the plants are able to sustain the stress and survive. The energy requirement of such plants is less.

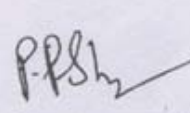
CONCLUSION :

The observations made during the survey of the four districts indicate the following :

1. In both Pati block (Badwani district) and Nisarpur (Dhar district) there is sporadic incidence of New Wilt (sudden drying)
2. The Bt hybrids seem to be more susceptible to New Wilt as compared to their refugia and other Non-Bt hybrids.
3. Summer sown Bt crop is more likely to be affected by New Wilt.
4. The soils of most of the Bt cotton affected fields were found to be marginal (light and shallow).
5. Refugia lines were sown only by a few farmers.
6. The farmers were not aware of the package of practices for cultivating Bt cotton crop.
7. The farmers said that no training by the seed companies as required under the conditions of permission accorded by the State Government was conducted or information regarding training was given to them.


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