
False hopes festering failures

BT COTTON IN AP - 2005-2006

*Fourth successive year of the Study
reconfirms the failure of Bt cotton*

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1. Introduction

The AP Coalition in Defence of Diversity [APCID], the Deccan Development Society [DDS] and the Permaculture Association of India [PCAI] have been studying the performance of Bt Cotton in some selected districts of AP since 2002. This is our fourth consecutive year of the study. We are delighted to see that many other NGOs are inspired by our efforts and new studies on Bt Cotton are emerging since last year.

From the years 2002-2003 to 2004-2005 the APCID-DDS report had covered mainly the Bt cotton hybrids called MCH 162, MCH 12 and MCH 184 which were introduced by Mahyco-Monsanto. The findings of the study had brought out the following points:

- Bt hybrids had failed miserably as small farmers could neither reduce pesticide use nor cost of cultivation.
- Some diseases similar to Rhizoctonia root rot, a soil borne pathogen, and Bacterial leaf blight had widely spread, first in Bt hybrid cotton which later infected the non-Bt hybrids.

In the light of this report and extended agitation by Bt farmers in the region, GEAC and the Government of Andhra Pradesh imposed a ban on the cultivation of Mahyco-Monsanto hybrids in Andhra Pradesh during 2005-2006 confirming the validity and authenticity of the facts brought out by the APCID/DDS study.

Between 2004 and 2006, a number of new Bt hybrids were released for cultivation in AP. These include RCH 20, ProAgro368, Bunny and Mallika, in addition to Raasi's RCH-2.

Therefore the Study 2005-2006 decided to analyse the performance of all the Bt hybrids in nine villages in three districts viz., Warangal, Adilabad and Nalgonda. Besides it also included the study of the Non-Pesticidal approach to cotton cultivation with non-Bt. hybrids which were already popular in the area.



II. AREA, PRODUCTION AND PRODUCTIVITY OF COTTON IN A.P.

The cotton farming has been playing an important role in the economic development of State and farm families as well. At the village level the extent of area and production by a family is seen as a **Status Symbol**. This is the reason that cotton cultivation reached a huge extent of nearly 12 lakh hectares in 2004-2005. [Area coverage under cotton in India and Andhra Pradesh, The extent of area under cotton, yearwise production and productivity of cotton are presented in Annexure under Table 1, 2, 3 & 4. The highest acreage of 11.78 lakh ha. was reached in 2004-2005.]

The average coverage and production for the last five years from 2001-2002 to 2005-2006 was as follows :

Average area	:	9.796 lakh ha.
Average production	:	18.918 lakh bales of 170 kg. each
Average productivity	:	328 kgs of lint per ha.

III. OBJECTIVES OF THE STUDY

The main objectives of study are as follows:

- i. To study the overall performance of Bt.Cotton vis-à-vis. Non-Bt cotton and NPM in cotton
- ii. To assess and study overall economics of cotton under the above three situations
- iii. To identify the constraints/problems under the three situations

IV. METHODOLOGY

1. Critical comparative field study at fortnightly interval
2. Collection of information, fortnightly, as per pre designed questionnaires through village based trained field investigations
3. Monthly review and field examination by a team of scientists
4. Monthly recording of farmer's interview through videography
5. The regular fortnightly visits assured recording of agronomic and plant protection problems, action taken, cost involved, while they are fresh in the memory of farmers and their family members and supported by videographic filming
6. Area selection for study : Returns from cotton crop, as in other states and countries are looked upon as a panacea for all the economic problems of farmers in AP state too.

Warangal District in Andhra Pradesh has witnessed a spate of cotton farmer's suicides, since 1997-98 till today due to seemingly unending failure of cotton crop. In spite of this, the district still supports nearly 15% of the cotton area of the state. Therefore Warangal, along with nearby districts where cotton is grown under rainfed as well as irrigated conditions were selected for study (Please refer Annexure for Table 2, 3 & 4)



V. CROP AND WEATHER SITUATION IN SELECTED AREA

Features of 2005-2006

The rains were delayed for 2 to 3 weeks in June and therefore caused delayed sowing of all Kharif rainfed crops including cotton.

In selected districts, June and August, this year had lesser rainfall than normal but adequately compensated the deficit in August, September and October. During these months wet spells alternated with dry spell. In some low lying areas wet spells caused water logging and affected the crop growth and yield. The alternating wet and dry spells have, as inferred by farmers and some scientists, lowered the intensity of incidence of Helicoverpa. Month wise actual and normal rainfall for selected districts is presented in Annexure under Table 6.

Soil Types

The selected area is characterized by the typical features of Telangana in A.P. namely undulating topography subjected to severe surface and gully erosion with exposed rocks and boulders. The vast stretch of red soils in the current tract is made up of coarse textured red soils in areas such as southern and eastern mandals of Warangal with low rainfall. Same are the conditions in parts of Nalgonda district.

There are also wide stretches of flat landscape with moderate to deep black soils of clay loam, very fertile, ideally suited for cotton cultivation, particularly in central, western, northern and north eastern parts of Warangal district.

Though Adilabad district, is in the black soil region, the villages identified for the study have undulated topography often severely eroded.

In addition there are other soils mildly affected by salinity, side by side with calcareous gravels exposed.

Loamy sands (ver. Dubba) are also frequently noticed in eroded red soil block

N.B: Farmers identify nearly 8 types of soils with specific and identifiable names.

Categories of Farmers and Total Area and Number of Sample Holdings and Crop Rotation Practices have been furnished in Annexure under Table 7, 8 & 9

VI. THE STUDY

The 9 village based investigators who already had the experience of the previous 3 studies, were given two re-orientations during May and June 2005 to cover the following

- (a) Bt gene and its transfer
- (b) Identification of cotton pests and diseases
- (c) Pheromone traps
- (d) Recording of observations and filling up of questionnaires
- (e) Non-pesticidal Management of cotton pests



Fortnightly schedule for field investigators :

- (i) 1st fortnight visit, 14, 15, 16 of June 05 to Feb 06
- (ii) 2nd fortnight visit 29,30,31 of June 05 to Feb 06

Visit of the Videography team :

1st week of every month from June to Feb

Scientists Schedules:

- (i) 1st week of every month
- (ii) 3rd or 4th week of every month

Monthly Review :

The data collected and the trends in the crop progress and impact of the weather was reviewed at Warangal every month and omissions/ new points were taken note of. This specially included the trend of monsoon rains and the pheromone trap data which were made use of for foreseeing the evolving problems. This was immediately followed by field visits

The field data collected was progressively updated, duly fed into computers and inferences discussed during the next meeting with heads of NGOs, field investigators and farmers. The field investigators were also taken round the Agriculture Research Station, Warangal, to see field trials on cotton, twice during the year.

VII. DATA ANALYSIS

The data collected from nine villages on Bt, Non Bt, and NPM fields has been analysed and the summary is comprehensively presented in Table No.10



Table – 10 : Comparative Cost of Cultivation, Net returns in respect of Bt., NonBt. And NPM cotton 2005-2006

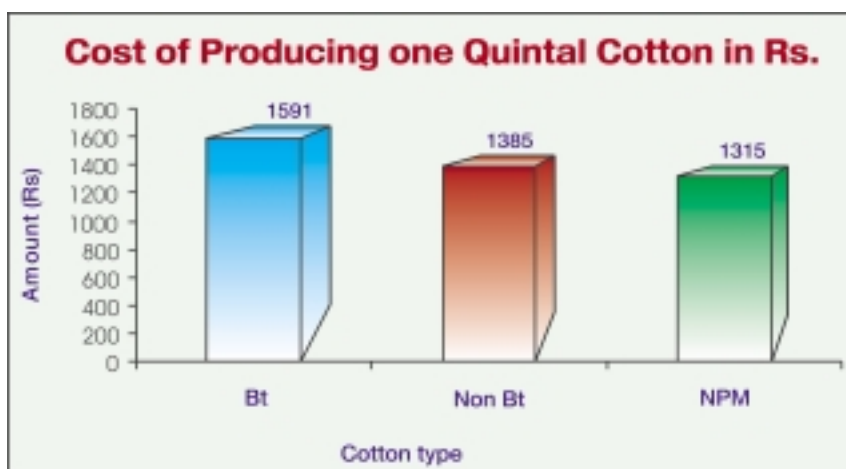
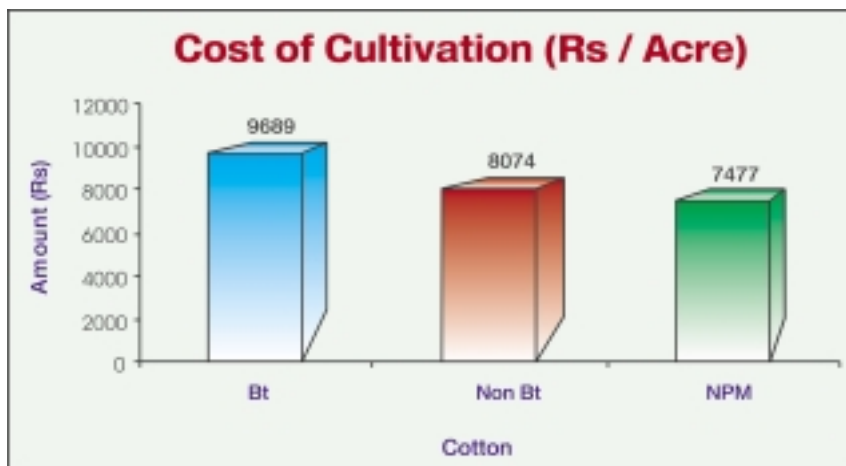
S.No	Parameters (field Activities)	Average cost in Rupees per acre						
				Non Bt.			NPM	
		Bt Cotton		Gain over Bt in Rs.	Gain over Bt in %		Gain over Bt in Rs.	Gain over Bt in %
1	Cost of seed	1750.80	481.80	1268.2	72.4%	473.7	1277.1	72.9%
2	Cost of manure and fertilizers	1680.6	1617.70	62.9	3.7%	1818.2	137.6	8.2%
3	Cost of pest and disease management	1351.15	1311.89	39.26	2.9%	679.22	671.93	49.7%
4	Cost of all other operations, preparatory, inter-cultivation, harvest, transport and marketing	4906.05	4662.91	243.14	4.9%	4505.83	400.22	8.16%
5	Total cost of cultivation in Rs.	9688.60	8074.30	1614.3	16.66%	7476.95	2211.65	22.83%
6	Yield of seed cotton kg/ac	609 kgs	583 kgs	-26 kgs	-6.09%	568 kgs	- 41 kgs	-6.6%
7	Gross returns [in Rs.]	11967.66	10995.80	971.86	8.12%	10545.68	1421.98	11.88%
8	Total Net returns [in Rs.]	2279.06	2921.5	642.442	8.81%	3084.80	805.74	35.35%
9	Cost of production	1590.88	1384.77	206.11	14.8%	1315.44	275.44	17.3%
10	Cost of Pest Management/ [Rs. Per 100 kgs]	214.32	211.15	3.17	1.5%	119.5	94.82	44.2%



VIII. FINDINGS

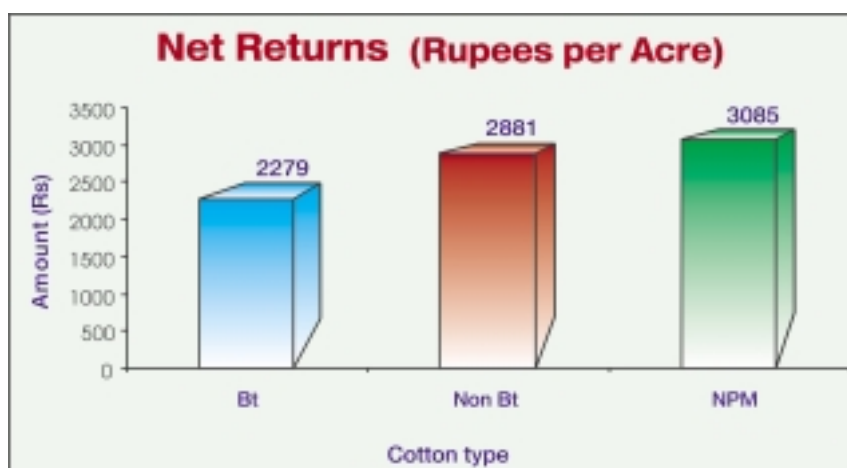
a. Cost of Cultivation:

- Bt recorded the highest cost of cultivation at Rs. 9689 per acre.
- Non Bt farmers spent Rs.1614/acre less than Bt farmers. Their cost of cultivation was Rs. 8074/-
- The highest gainers were farmers who adopted non pesticidal methods (NPM) to control pests on their cotton. They spent Rs.7477 per acre. They thus gained Rs.2212 per acre over Bt farmers. (Please see item 5 of Table 10)
- Bt cotton gave a marginally higher yield of 25 kgs per acre [6%] more than non Bt farmers. But the cost of producing 100 kgs of cotton was lowest in respect of NPM followed by Non.Bt (Please see item 9 of Table 10)



b. Net Returns: Net returns per acre were highest in respect of NPM farmers who gained Rs.3085/- per acre. They were followed by Non-Bt farmers who gained Rs.2881/- per acre. Bt farmers who earned Rs.2279 per acre were at the bottom of the heap. (Please see Item 8 of Table 10)

It was conclusively proved once again that NPM and Non Bt farmers gained more economical benefits than Bt.cotton.



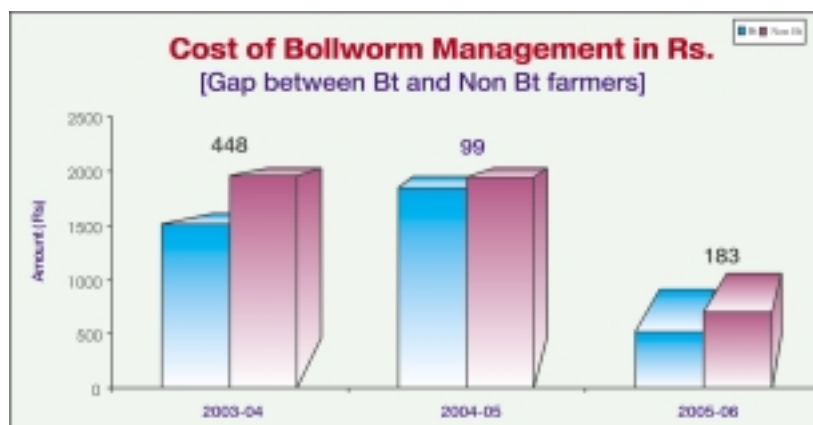
c. Pest Management *Bt cotton comes with the promise that it will significantly reduce the pest management costs. But the study shows that the cost of Pest Management was lowest for farmers practising NPM methods. They spent only Rs. 679/- per acre as against Bt.cotton farmers who spent Rs.1351/- per acre, Even Non.Bt farmers who sprayed pesticides on their fields spent Rs. 1312/- per acre, Rs.39 less than Bt farmers. Thus the only concrete promise that came with Bt also proved false.*



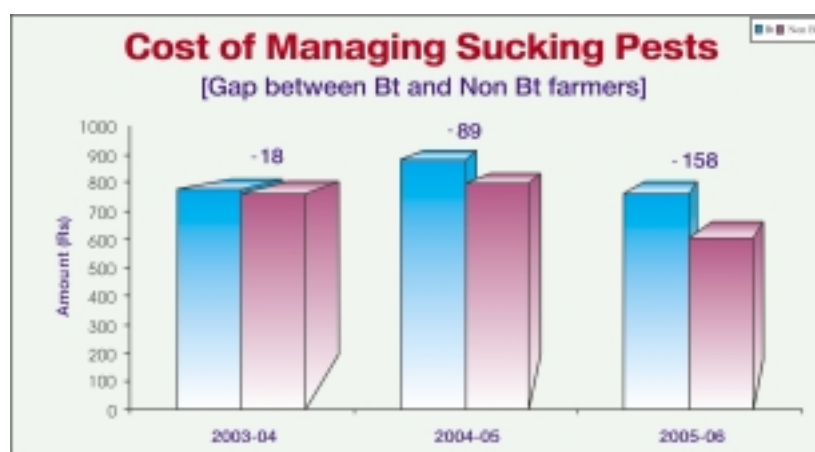
The incidence of American bollworm [the pest against the attack of which the Bt Cotton is advocated] was low throughout the area under study irrespective of the fact whether the farmer was growing Bt cotton or non Bt hybrids or practicing NPM. However another important group of pests on cotton viz., Sucking Pest was rampant this year. **Interestingly its incidence was higher in case of Bt and extended to longer duration i.e. upto the end of Jan 2006. Therefore Bt farmers had to spray once or twice more than Non Bt farmers.**



On the other hand, farmers pursuing NPM practices had to use no insecticide at all



This trend of higher incidence of sucking pests (aphids, Jassids and whitefly combine) was also noticed during the preceding 2 seasons



d. Virus infestation :

IS BT COTTON A HARBINGER OF HITHERTO UNKNOWN DISEASES ON COTTON? DOES IT CAUSE SUCH DISEASES AND HELP THEM GROW?

This question occupies our uppermost concern in view of the following facts:

- ***A new phenomenon that occurred this year was the virus infestation (suspected to be Tobacco Streak Virus) which was noted throughout the study area from late August 2005 onwards. The virus infestation continued upto the end of September 2005.***
- ***Farmers noted that the symptoms of “leaves curling” were noted first in Bt hybrids. This later on spread to Non Bt hybrids also. Farmers sprayed a variety of chemical pesticides, micronutrients etc to fight this virus but of no avail.***
- ***The Virus Infestation was followed by reddening of leaves followed by wilting and dropping of leaves and cotton bolls. This phenomenon was wide spread from September onwards and caused severe loss of plant vigour. In many cases whole plants wilted.***
- ***Bacterial leaf blight were also observed and were more intense on Bt and lesser on Non Bt.***



IX. CONCLUSION

The study 2005-2006 has reiterated the past three year's findings that the local hybrids are on par with Bt cotton hybrids in the areas of yield and surpass Bt in the economics of cultivation. Besides there is **no reduction in pesticide use** in Bt vis a vis non Bt and therefore the **USP of Bt has proved a mere hype**.

1. **The higher cost of cultivation of Bt cotton warrants its prohibition in Andhra Pradesh.** The cost of seed of Bt cotton is nearly four times higher than the seed cost of non Bt hybrids and traps farmers loans from day 1 (Item 1 of Table 7). Earlier farmers never had to borrow money for purchase of seeds. But now they are forced to do so if they have to buy Bt seeds.
2. Bt industry has consistently proclaimed that its greatest Cost of plant protection [in other words use of pesticides] would drastically come down with the use of Bt Cotton. But the **study shows a higher expenditure for Bt farmers on Plant Protection.**
3. **The yield difference between Bt and non Bt farmers was also insignificant.** On an average Bt farmers got just about 6% higher yield. Much of this can be ascribed to preferential treatment they gave to Bt cotton cultivation by sowing it on their best soils, location and giving it good irrigation. Farmers do this since they have spent three times more on purchasing Bt. Seed in comparison with other hybrids and they tend not to take any risk on it.
4. **The net returns per acre are the lowest in respect of Bt cotton and highest in respect of NPM.** This is the fourth year that Bt farmers are getting the lowest net returns.
5. **The loudest claim by the Bt industry is that it is resistant to bollworms (American bollworm particularly). But this is a false claim** as can be seen from the data which does not reflect any reduction in cost of pesticides applied or number of sprays for Bt cotton.
6. Tobacco streak viruses, early reddening of Bt.cotton leaves followed by wilt are dangerous signals of impending problems. They have appeared for the first time in the cotton fields of Warangal, particularly on Bt. **This leaves us guessing whether Bt cotton is a carrier of new diseases not seen until now.**
7. The endo toxin produced by the implanted gene in Bt.cotton and residual toxicity in cotton seed oil and cake have not been adequately tested under Indian conditions.

X. RECOMMENDATIONS

1. **The ban on Bt cotton to be extended to cover all G.M. cotton till all materials are adequately tested and found safe on soil borne and beneficial organisms, grazing cattle and human beings.**
2. **The present lacunae in regulating strategy and logistics should be detected and eliminated**
3. **The field trials and tests on the new GM Bt. or other crops being conducted by government institutions or proposed to be conducted should be widely publicized and the NGOs or farmers organization be invited for regular periodic review.**
4. **The National Institute of Nutrition and concerned health department should take active steps to test Bt cotton for the effects on humans, animals and soils of the Bt or any other toxins contained in its crops by subjecting them to rigorous chemical tests and feeding trials.**

It has to be clearly recognized that Bt has proved that it is no alternative to the present cotton cultivation problems. The viable alternative is in the form of NPM approach which has not only proved to be safer, self supporting, sustainable but also economically a sound proposition.



XI. Annexures

Table - 1 : Area coverage under cotton in India and Andhra Pradesh

Year/period	Area in lakh of hectare			Total production in lakhs of Bales of 170 Kgs each		
	A.P	India	A.P as % of all India	A.P.	India	A.P as % of all India
Average for the period of 5 years ending with 2000-2001	10.54	89.14	11.82	15.92	116.84	13.6
2001-2002	11.08	91.30	12.9	18.77	116.84	13.6
2002-2003	8.03	76.7	10.47	10.86	87.2	12.5
2003-2004	8.37	76.4	10.95	18.90	137.9	13.7
2004-2005	11.78	P.N.A	P.N.A	21.91	P.N.A	P.N.A
2005-2006 Estimate	9.72	P.N.A	P.N.A	24.15	P.N.A	P.N.A

P.N.A. : Presently not available

Table - 2 : Area Under Cotton in Selected Districts for the period 2003-04 to 2005-06

State/District	Cotton Area in lakhs of hectares			Average of three years
	2003-2004	2004-2005	2005-2006 (estimates)	
Total of AP	8.37	11.78	9.723	9.954
Warangal	1.24 (14.8)*	1.53 (13.0)	1.477 (15.2)	1.416 (14.2)
Nalgonda	0.64 (7.6)	1.04 (8.8)	0.830 (8.5)	0.836 (8.40)
Adilabad	1.45 (17.3)	1.78 (15.1)	1.557 (16.3)	1.596 (16.02)
Total cotton area of 3 districts (2+3+4)	3.33 (39.7)	4.35 (36.9)	3.86(39.7)	3.847 (38.86)

*Figures in parentheses indicate % to total cotton area of State.
The three selected districts have 40% of cotton area of the State of A.P.



Table - 3 : Year Wise Cotton Production In Selected Districts

State/District	Year-wise cotton production in lakh bales of 170 kgs. Each			Average production for three years (lakh bales)
	2003-2004	2004-2005	2005-2006 (estimates)	
Andhra Pradesh	18.90	21.90	24.16	21.65
Warangal	2.79 (14.8)*	2.88 (13.15)	3.954 (16.36)	3.208 (14.8)
Adilabad	2.88 (15.23)	2.37 (10.82)	3.829 (15.76Q)	3.019 (13.94)
Nalgonda @	1.12 (5.9)	1.31 (5.98)	2.004 (8.2)	1.478 (6.82)
% of production for 3 districts	6.79 (35.9)	6.56 (29.95%)	9.787 (40.5)	7.706 (35.6)

@ The 3 districts selected for study on Bt.cotton

- Figures in parentheses indicate percentage to State total products

Table - 4 : Productivity of cotton per hectare in selected districts

State/selected districts	Year-wise productivity in Kgs of lint per hectre			Average for three years (Kgs of lint/ha)
	2003-2004	2004-2005	2005-2006 (estimates)	
Andhra Pradesh	384	316	422	374
Warangal	384	320	455	386
Adilabad	337	226	416	326
Nalgonda	300	214	410	308

Table - 5 : List of Villages Selected for the Study

Sl. No	Village	Mandal	District	NGOs participating
1	Parvathigiri	Parvathagiri	Warangal	MARI, Hanamkonda
1a	Jagguthanda	Parvathagiri	Warangal	MARI, Hanamkonda
2	Damera	Athmakur	Warangal	Sarvodaya Youth Organisation
3	Narlapur	Parkal	Warangal	SEED
4	Jawaharnagar	Venkatapur	Warangal	SPACE
5	Narsimlagudem	Hanamkonda	Warangal	Shanti Service Society
6	Gundrampally	Nekkonda	Warangal	Pragathi Seva Samithi
7	Cheetur	Lingal Ghanpur	Warangal	CROPS
8	Jamgoan	Kubcer	Adilabad	SUN (P)
9	Cholluru	Raigeer	Nalgonda	PEACE



Table - 6: Month wise Actual and Normal Rainfall for selected districts from April – December 2005

Rainfall in mm.

Month	Warangal		Nalgonda		Adilabad		Telangana	
	Act	Nor	Act	Nor	Act	Nor	Act	Nor
Apr	12	15	8	8	6	10	17	13
May	24	36	21	29	11	21	17	30
June	125	137	33	91	140	200	90	128
July	352	288	248	171	520	329	335	239
Aug	101	238	64	154	168	314	120	219
Sep	340	136	231	146	172	141	275	129
Oct	140	86	279	102	98	98	164	98
Nov	0	27	4	34	0	11	3	25
Dec	13	6	6	3	12	7	5	6
Total	1107	969	894	738	1127	1131	1026	867

Act = Actual ; Nor = Normal

Red figures : Rain fall lesser than normal

Green figures : Rain fall higher than normal

Table – 7: Categories of Farmers Studied

Programme	No.of Small farmers (owning 5ac. Or less)	No.of medium farmers (owning > 5 ac upto 10ac.	Total
Study of Bt.v/s Non Bt	72	18	90
Study of NPM in cotton	77	13	90
Total	149	31	180

Table – 8 : Total Area and Number of Sample Holdings Covered Under Study

SNo	Programmes	No.of holdings	Total Area in acres	Total area under cotton	Area under irrigated cotton (Ac)	Area under rainfed cotton (Ac)
1	Bt v/s Non Bt Study	90	455	310.5 (68%)	131.5 (42.3%)	178.5 (57.5%)
2	NPM Study	90	371.5	239.75 (64.5%)	73.00 (30.5%)	166.75 (69.5%)

N.B : Figures in parenthesis indicate percentage to total number of holdings/farmers. This year (2005-2006) with adequate rains there was water available in bore wells therefore irrigation was given to some of rainfed areas



Table – 9 : Crop Rotation Practice

S.No	Programme	Total No. ofholdings	Crop Rotation followed	Crop Rotation not followed
1(a)	Study on Bt.field	90	19(21.1)	71(78.9)
1(b)	Non Bt.	-do-	12 (13.3)	78(86.6)
2	NPM field	90	22(24.4)	68 (75.6)

