Case study: ICM in Cotton of Davanagere district

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Cotton is a major commercial crop providing employment to 27 million persons with decent income in the country. Cotton fiber accounts for almost 70% of the raw material of the mix of the textile industry. India occupies 27% of total area in the world under Cotton. Ranks first among other countries in Cotton area and second in production. India made laudable progress from 0.2 million bales with 88kg/ha of lint productivity during the early 50s to 29.2 million bales with 488kg/ha of lint productivity in 2009-10. Also it is the first and so far the only country, that grows hybrid cotton both intraspecies and inter specific hybrid on commercial scale. Maharashtra ranks first in area of 31.33 lakh hectare followed by Gujarat, Andrapradesh, Madhyapradesh, Punjab, Haryana, Karnataka ,Rajasthan and Tamilnadu. Cotton is a major commercial crop grown in almost all the agro-climate zones of Karnataka. In Karnataka, cotton area during 2009 -10 was 4.27 lakh ha with production of 9.5 lakh bales and productivity of 378 kg lint/ha.

Taxonomy of Cotton

The genus *Gossypium* consists of about 50 species, only four of which (*G. hirsutum*, *G. barbadense*, *G. arboreum*, and *G. herbaceum*) are domesticated and produce spinnable fiber. *G. hirsutum* and *G. barbadense* are New World tetraploids (2n = 4x = 52; *AD* genome species), and G. *arboreum* and *G. herbaceum* are Asian-African diploids (2n = 26; *A*) genome species. India is the only country where all four species are grown and where about 20-30% of cotton produced consists of *G. arboreum*. *G. hirsutum* is considered the most important of the cotton-yielding plants, providing about 87% of commercial cottons.

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Davanagere district consists of six taluks, Harapanahalli, Jagalur, Harihara, Davanagere, Channagiri and Honnali. During 1990's Cotton area under Davanagere district was 25000 ha. But in 2003-04 Cotton area was reduced to 3,131 ha due to severe pest incidence, low yield and shutdown of cotton mills. Recent trend in cotton area and production of Davanagere district is shown in table-1 and one can see a gradual increase in the same during past 3 years.

Table – 1: Cotton scenario of the district

Year	Area (ha)	Production (Bales)
2002-03	4667	4,759
2003-04	3131	3,007
2004-05	9620	13,485
2005-06	5294	3,008
2006-07	6657	7,160
2007-08	6773	43,232
2008-09	12640	1,02,110

Table – 2: Rainfall data (mm)

Month	2003	2004	2005	2006
June	21.8	46.1	70.8	74.3
July	27.1	91.1	203.6	96.0
August	99.5	84.4	117.8	33.6
September	10.5	208.4	107.4	76.4
October	150.2	112.0	132.4	28.2
November	--	--	38.4	55.6

Taralabalu Krishi Vigyan Kendra came into existence during May 2005-06. Under Mini Mission of Cotton project our KVK had taken 50 acre demonstration in Bt cotton. Based on the survey and discussion with line departments, **we selected** Budihal, Nandikamba and Anajigere villages of Harapanahalli taluk for demonstration. Rainfall data in the selected area was found to be optimum for cotton production although erratic during some part of the years. (Table-2)

Farmers and scientists interacted with brain storming session in the villages for Bt-cotton introduction. Farmers were of the opinion that Cotton is a waste crop, requires more pesticides and inturn increased cost of production. They also added that ten years back cotton area was more than 500 acres in their village and now it is hardly 5-10 acres in each village.

We were able to convince the farmers and selected 50 farmers for demonstration during 2006-07. First step after selection was the collection of **soil samples** from each demo plot and analyzed for nutrient status. Based on the soil test report, fertilizers were applied. KVK had conducted On campus and Off campus training programmes on improved Cotton production technology. We also introduced growth regulator (Planofix), $MgSO_4$ and pheromone traps in the package of the technologies. During that year, **senior scientists** from **Zonal Project Directorate –Zone VIII and Board members of Taralabalu Rural Development Foundation, Sirigere visited the Front Line Demonstration plots.** Farmers expressed that, who have grown maize suffered huge losses due to low rainfall at critical stages of crop growth during August and September 2006. Farmers were able to harvest only 15 q/ha against 60 q/ha with maize. On the other hand the farmers who had grown cotton under our FLD with Bt cotton technology did harvest 9 q/ha. The net income of the maize farmers was very low compared to the cotton grown farmer (Table-3).

Table – 3: Yield and income

Crop	Yield (q/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Bt Cotton	9	16,125	25,200	9,075	0.56
Maize	15	7,500	9,000	1,500	0.20

Note: Sale price : Rs. 2500-00/q (Cotton), Rs.600-00/q (Maize)

During the year 2007-08 farmers themselves came forward for cotton production. Then, we repeated the FLD with different farmers in the same villages. Now the cotton area has increased to >500 ha in and around Anajigere panchayath villages because of our KVK intervention during the **field visit.** (Table-4).

Table-4 : A survey conducted in Budihal/ Anajigere villages regarding Cotton area

Year	Area
2003-04	150 ha
2004-05	10 ha
2005-06	20 ha
2006-07	30 ha
2007-08	250 ha
2008-09	>500 ha

During the year 2008-09, cotton area in the district was found to be 15000 ha and it is replacing the maize and sunflower in some taluks as observed in the data collected by the Department of Agriculture. We have surveyed the market sale of Bt cotton seeds (Table-5) and by looking at this data we can clearly say that area is catching up in the district as a whole.

Table-5: A market survey conducted in Davanagere regarding sales of Bt Cotton seeds

Year	No. of packets
2005	3,800
2006	40,000
2007	50,000
2008	83,000

Turning point in our intervention was **Farmer Field School** in the Bt cotton production (ICM) which fine tuned the understanding of Bt technology in cotton by farmers during 2008-09.

KVK had conducted Farmers Field School in Bt Cotton during 2008-09 at Budihal involving 30 farmers on ICM v/s Non ICM in Bt cotton. It was a huge success and collaborator farmer is now the leader in cotton technology for the village.

During 2009-10 cotton has replaced sunflower to a substantial extent in Harapanahalli and Jagalur taluk. Farmers are convinced with the technology and now they have become experts in utilizing the same for their benefit through KVK technologies. The farmers are now able to talk about technology in Bt cotton and now they are ready to practice it without our presence. This new practice fetching higher yield and higher income with reduced cost of production for the farmers.

During **field day** conducted in the year 2007-08, Mr. Nagaraj a farmer from Budihal had expressed that he had harvested 60 q of cotton in 3 acres and claims that he has cleared the Bank loans and leading his life happily after our KVK's intervention in Bt technology. Another farmer, Mr. Kenchappa of Anajigere harvested 48 q of cotton in 2.5 acre land by giving protective irrigation at critical stages.

Conclusion: Bt cotton technology informed by our KVK has certainly brought smile on the faces of farmers and success of these farmers has impacted their friends and relatives to go in for cotton production. As long as Bt cotton seeds are supplied in time and with Government subsidy regaining its earlier name in cotton production is not an impossible dream for Davanagere district, given the strong technical backup of our KVK.