

ANALYSIS AND RECOMMENDATIONS ON
OF EARLY SOWN AND SEASONAL COTTON
FROM RAEDC, VEHARI

By

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SUMMARY

A detailed survey was conducted, in light of the directions of Govt. of Punjab, for early sown and seasonal sown cotton in district Vehari. The survey consisted on the areas where early cotton was sown and both the early and seasonal cotton were surveyed. The analysis of 85 farmer field surveys suggests that cotton is responsive to date of sowing in terms of production, as well as CLCV prevalence and intensity. The early sown crops have resulted in good average yield and a fair escape from CLCV whereas the same have enhanced early establishment of Pink boll worm and whitefly, but both the pests have been managed satisfactorily where the farmer has taken proper plant protection measures. The net profitability of the cotton grower was also better for those who completed their sowing earlier.

Therefore, it is recommended that such studies should be extended in whole cotton zone for next two years for consistency in results for taking a permanent decision. As an interim decision the farmers should be allowed for sowing cotton from March 15, anyhow, sowing prior to this period may be banned in public interest to minimize multiplication of Pink boll worm and grab maximum chunk of production potential from cotton crop.

Analysis and recommendations on of Early sown and seasonal cotton from RAEDC, Vehari

In cotton season 2017, a special task was assigned to undersigned in addition to routine duties of RAEDC, as to analyze the early sown cotton in district Vehari and compare it with the seasonal one to come with recommendations whether the ban on early sown cotton is justified in larger interest of farmers or otherwise, so that it is helpful in making decision in future/ for the next crop. The premature outcomes were shared with Ch. Khalid Mehood, Ex-DG PWQCP, Lahore and Syed Zafar Yab Haider, DG, Ext & AR during corner meetings. The detailed report is submitted for your kind perusal.

1. A rapid comparison between early and seasonal cotton from different aspects

No specific definition of early and seasonal cotton exists for the time being. Different possible definitions of early cotton in 2017 could be,

1. Only the cotton crop sown in tunnel environment along with any vegetable initiated in tunnel in December
2. Tunnel grown along with all other cotton grown in open fields before the initially principally permitted date of sowing ie. 15.04.2017
3. Cotton sown before actually permitted date of sowing 01.04.2017 (at BARI, Chakwal)
4. Cotton sown before harvest of wheat (usual cropping pattern of this area) in fellow lands or after maize, sugarcane etc.

Similarly there was no specific definition of seasonal cotton. Different possible definitions of seasonal cotton in 2017 could be,

1. Any cotton crop not sown in tunnel environment along with any vegetable or not initiated in tunnel
2. Openly sown cotton in general sowing season after 15.04.2017 (the initially principally permitted date of sowing ie. 15.04.2017) in fellow lands or after maize, sugarcane etc.
3. Cotton sown after actually permitted date of sowing 01.04.2017 (at BARI, Chakwal)
4. Cotton sown after harvest of wheat (usual cropping pattern of this area)

Therefore, the data collected were not bifurcated in early and seasonal, rather a week wise and fortnight wise and moth wise summary is presented so that it can be helpful to the professionals to draw a line of demarcation between both early and seasonal. Following are the features of data collected.

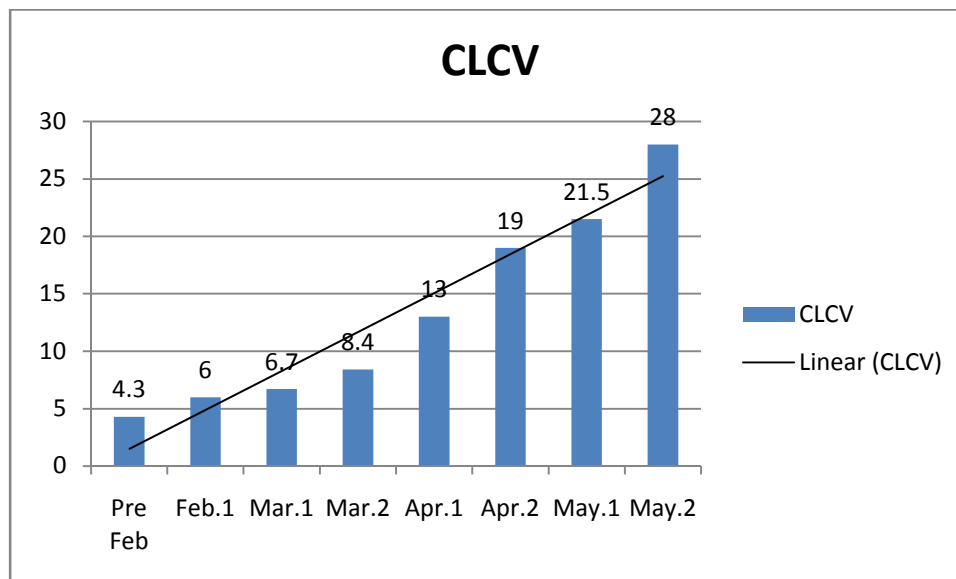
1. The data are not based on experimental plots, rather it is general field data collected from different farmers. Usually the data undertaken included the selected farmers, one farmer who had early sown cotton and at least one farmer in his vicinity having seasonal cotton for close comparison.
2. Data are confined to district Vehari, although it was desirable if could be extended to other cotton growing districts also, for better and comprehensive results.

3. The studies were started in August, 2017, so the inputs have been got from interviews from cotton growers and experts estimates from plant mapping studies
4. In case grower failed to provide information the inputs were taken by scientific assessment and plant studies
5. Pest scouting Survey of both fields
6. Views of research and field workers
7. Pest scouting experience of previous service
8. Personal experience and observations
9. Views of dealers and ginners

Advantages of Early cotton

1. Escape from CLCV

It was observed from the collected data, that early sown cotton had more chances of escape from CLCV as compared to seasonal one as shown in graph below.



Fig# 1: GRAPH SHOWING TREND OF CLCV INFESTATION ON COTTON SOWN IN DIFFERENT FORTNIGHTS OF THE SOWING SEASON 2017 IN DISTRICT, VEHARI

Out of above mentioned data the intensity in pre-February cotton was negligible, and the intensity in remaining infested fields was low and it increased in delay in sowing time of the crop

2. Better control of weeds

It was observed that the fields in which cotton was sown as shown in fig below

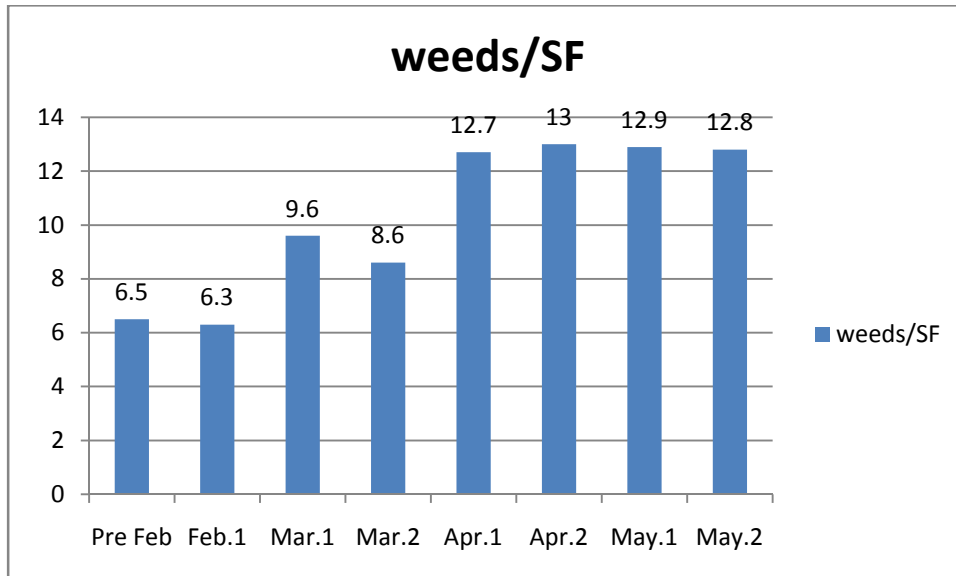


Fig #2. GRAPH SHOWING WEED INFESTATION /SQ. FT. IN THE COTTON FIELDS SOWN IN DIFFERENT FORTNIGHTS OF SOWING SEASON 2017 IN DISTRICT VEHARI

Obviously the cotton fields having sown in fortnights of April 1,2 and May 1,2 have identical infestation of weeds relatively higher than those fields sown in pre February, February or March. It is possibly because in earlier season Rabi weeds invade the cotton fields which fade out with rising summer temperature, and Kharif weeds replace them in summer season. Cotton sown in rabi season attains a reasonable size and canopy so kharif weeds have to face severe inter specific competition and hence are less established as compared to cotton sown in proper summer season.

3. Low pest pressure in earlier months

In environmental conditions of Pakistan winter season Nov-Feb is adverse for most of the insect pests. The insect pests hibernate in winter and undergo an inactive phase or their life cycle is prolonged and population and fecundity is greatly reduced. The life cycle of most of the insects takes a new start in the end of Feb or start of March and the population goes on increasing considerably with shortening life cycle and increasing fecundity, and usually population attains a peak in the months of August and September. So the late sown cotton has to combat with peak population whereas earlier one enjoys a smart escape with support of natural environmental conditions of the country.

4. Low risk of rainy season

Cotton is not a water loving crop although it has some stages which critically require irrigation in limited quantity. So much so, if cotton fields (roots only) are submerged in water and could not be drained out for three days the cotton plant may die out altogether. Standing water has adverse effect on health of cotton plant. Late sown cotton has to face heavy rains in July-August, in the climatic conditions of Pakistan so sometimes it can be a major cause of low production of cotton.

5. Feasible for intercropping, vegetables, tunnels etc

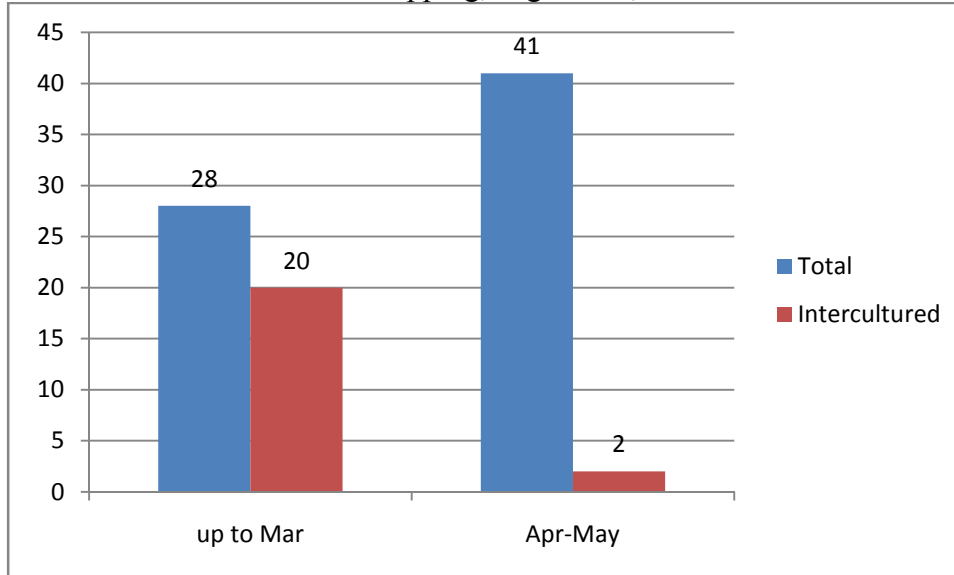


Fig #3. GRAPH SHOWING INTERCROPPING OF COTTON WITH OTHER CROPS IN DIFFERENT SOWING MONTHS IN SOWING SEASON 2017 IN DISTRICT VEHARI

It can be observed from the above graph that 71.4 % of the cotton sown in March was intercropped (with onion 25% , onion+ musk melon 35% water melon 15% and melon 25%), so it had appositive increase in cost benefit ratio. Whereas in seasonal cotton only April- May, only 4.5% fields were intercropped with onion and those fields were in first week of April. It is a desirable trend in diversified agriculture and intensive cultivation, which should be welcomed.

6. Minimum crop failure risk

It has been observed that early sown cotton has performed better, as there were minimum chances of crop failure. In 31 cases where cotton was sown before March 31, the production ranged from 33 to 63 mds/acre with an average of 48.7 mds per acre but in late sown crop the yield went on decreasing as shown in following table. In early sown cotton even if it could not be managed up to desired level, a reasonable average yield has been obtained /harvested. It can also be observed that Feb sown cotton has not performed better than March sown so March, according to this data, is the optimum time of sowing in our cotton growing area (Vehari). But at the same time, it can be noticed that cotton sown after March 15, has performed as good as that before March 15. In other words the data suggests that we can harvest maximum yield potential of cotton if we can manage its sowing just after March 15, instead of its sowing in tunnel or in early March. This feature is evident in table 3, where the different features of cotton field have been compared.

Table 1: ANALYSIS OF YIELD IN SELECTED COTTON LOCALITIES IN RELATION TO EARLY SOWING IN COTTON FIELDS OF F FARMERS DISTRICT VEHARI DURING YEAR 2017 SURVEYED BY RAEDC TEAM

Sowing Period	spots	range	Av.yld
B. Jun 15	85	11- 63	36.0
B. May 31	81	17-63	36.9
B. May 15	70	17-63	38.7
B. Apr 15	38	33-63	44.3
B. Mar 31	31	33-63	47.8
B. Mar 15	21	33-63	47.9
B. Feb 28	9	33-52	42.5

Similarly if we see the average farmer yield from late to early we see the trend as under. The Table

Table 2: ANALYSIS OF YIELD IN SELECTED COTTON LOCALITIES IN RELATION TO LATE SOWING IN COTTON FIELDS OF F FARMERS DISTRICT VEHARI DURING YEAR 2017 SURVEYED BY RAEDC TEAM

Sowing Period	spots	range	Av.yld
After Jun 15	0	0	0
After May 31	4	11-24	19.3
After May 15	15	11-30	23.5
After Apr 30	37	11-31	24.4
After Apr 15	46	11-44	26.2
After Mar 31	54	11-59	29.3
After Mar 15	64	11-63	32.1
After Feb 28	76	11-63	35.3
After Feb 15	81	11-63	35.4
After Jan 31	85	11-63	36.0

It can be observed from the data in table 2 that, more late the sowing is, less returns of sowing cotton grower receives as the average yield of the farmers goes on decreasing. Similarly, the data show that the potential of cotton production shows the same trend it goes on decreasing as the sowing time is delayed. The table shows that average yield potential of different varieties determined in the data is 63 mds/acre, in farmer fields. This potential is retained in the cotton fields sown from March 15 till March 31, but in the field sown after April 1, it has apparently decreased (That might be statistically identical, since the data has not undergone statistical analysis yet.)

It is obvious from the data that the benefits we want to get from earliest sown cotton crop are available if we can sow it in the last fortnight of March. It is also evident that high average in early sown and low average yield in late sown cotton with the farming community of the same locality, having similar rather same agronomic practices, similar plant protection measures, and similar level of knowledge make a reason to believe that importance of the role of sowing time in cotton production cannot be over looked. The data provides a clear indication that if we need

more cotton production in the country we will have to adopt and bear early cotton sowing as “necessary evil”, a term which is usually used for irrigation water.

7. Plant population and gap filling possible

It has been observed that in early sown cotton the plant population is less as compared to desired and recommended by the experts. It is because in case cotton is intercropped in vegetable fields (musk melon, water melon etc.), the beds are wide 4 -5 feet wide, therefore the average plant population is less. But there are chances of gap filling, if the farmer need to fill the gaps he has an ample span of season in which he can sow the additional seeds by dibbling by already existing bed used for vegetables, or prepared for cotton. This opportunity is not available in late sown cotton, because ending season forces the farmers to go to the alternatives. So the early sown cotton provides an opportunity to the farmer although it might be practically very difficult.

Table 3: ANALYSIS OF VARIOUS FEATURES OF SELECTED COTTON FIELDS IN RELATION TO SOWING FORTNIGHTS IN COTTON FIELDS OF F FARMERS DISTRICT VEHARI DURING YEAR 2017 SURVEYED BY RAEDC TEAM

Sowing Fortnight	No of Spots =n	Area (Acres)	Intercultured spots	Av. Plant Population 000	Av. Height cms	Av. Yield mds/acre
Pre Feb	4	24	4	14750	171	48
Feb.1	3	25	3	11333	164	41
Mar.1	6	110	3	15400	162	52
Mar.2	10	93	10	13142	141	47.6
Apr.1	8	104	2	15625	163	47.1
Apr.2	7	75	0	17857	136	36.4
May.1	15	101	0	17333	134	26.5
May.2	11	55	0	16500	125	25

8. Usually good rate of produce expected and received

The data collected revealed that the early cotton has received comparatively better price from the market than the late sown or seasonal one as shown in the graph below. Average price received for cotton produce sown after April 15, is 7.2 % less than the average price received for the cotton sown before that date.

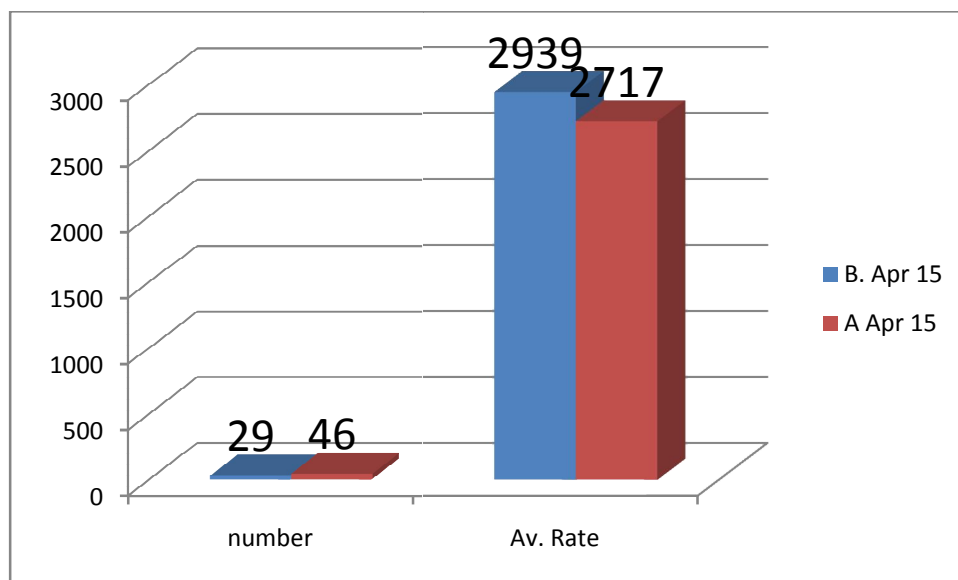


Fig #4. GRAPH SHOWING COMPARATIVE AVERAGE PRICES IN EARLY AND LATE SOWN COTTON IN SOWING SEASON 2017 IN DISTRICT VEHARI

9. Early financial support to farmer

The cotton growers who had grown cotton before Aril were in receipt of 10 to 25 % revenue of their crop in July and August, and were in better position to invest on cotton to get remaining yield out of it, whereas, the seasonal cotton growers had received nothing because crop was in rigorous vegetative growth stage or early reproductive stage. In this way the farmers who have sown early cotton were not dependent on banks or other lending agencies for borrowing the finance required for desired yield of cotton out of their fields. It has been found more rewarding as compared to seasonal cotton. A simple comparison between the cotton sown before and after April 15, is elaborated in table 4 as under.

Although it is based on surveys of selected sites (where early cotton was sown) even then it can provide an insight to the income and expenditure ratio of the cotton sown on different dates, that is Cotton with any other crop as sown in tunnels etc. and cotton sown after wheat.

Table 4: ANALYSIS OF DIFFERENT CROPPING PATTERNS IN TERMS OF INCOME EXPENDITURE IN SELECTED COTTON FIELDS SURVEYED IN DISTRICT VEHARI DURING YEAR 2017 BY RAEDC TEAM

Comparison of cost and benefit on early and seasonal cotton			
Yearly average	Cotton++ expenses	Cotton-Wheat -C expenses	Remarks/ Explanations
Lease (av.)	43073	43073	yearly average
soil prep	6000	12000	1/2@6000/3+1
Seed ++	12000	3300	veg.C /w.C
Irrigations	30400	22800	32/24
Weedicides	1200	2400	1/2 @1200/ac

Hoeing	2400	400	3/0.5 @ 800/ac
fertilizers	20000	16000	10/8 @ 2000
pesticides	22400	11200	16/8 @ 1400/ac
Thinning +GF	3000	1000	1/0 Gap filling+thinning
others	24000	16000	12 / 8 @2000/ac
total	164473	128173	
Av. Yield cotton	43.5	26.2	early Before Apr. 15
Av. Rate/md	2939	2717	Seasonal After Apr. 15
Income cotton	127846	71185	av. Rate*av. Yield
intercrop Revenue	78263	0	Av. (n=11)
Wheat Revenue	0	42250	32.5 mds (n=11)@Rs.1300
total Revenue	206109	113435	
Income Exp. ratio	1.253/1	0.88/1	On basis of survey(85)

10. Manipulation of beneficial fauna an opportunity

Conservation of beneficial fauna is a desirable phenomenon all over the world, and in advanced countries measures are taken to assure the least deterioration of this natural beneficial resource. When the pests establish, the beneficial fauna also establishes afterwards in due course of time. If the measures are taken which ensure Bio-intensive IPM of cotton, it proves useful and effective. This year 2017, this model was adopted as an experiment at RAEDC farm cotton, the results were encouraging and it seems to be practicable, feasible and economical. Next year it will be replicated with different progressive farmers in other cotton growing districts of Punjab, with a special permission from the authority, and if the results are similar and desirable, the model can be recommended for adoption with general farming community.

Disadvantages of Early cotton

1. Single crop of the year

One of the disadvantages of early sown cotton is that it is misfit in crop rotation program and usually it remains the single crop of the year, particularly the farmers who sow cotton for seed purposes. It also jeopardizes wheat production which is our major staple food crop, although for the time being we are surplus in wheat, but in this case, early cotton competes, as a routine it was a usual and best pair of crop sown in consecutive order as wheat-cotton-wheat-cotton.

Possible Solutions:

- a. High yielding wheat varieties which suffice for our national needs from remaining area not brought under early cotton.
- b. Use of intercultural crops
- c. Bringing more area under cultivation eg. Cholistan, pothohar, pachad, Baluchistan etc.

2. Capital intensive crop

Cotton is a capital intensive crop. It needs continuous expenditure from sowing to harvesting, and one who does not invest in the crop properly fails in getting good even satisfactory yield from the cotton fields.

Possible Solutions:

- a. Training of farming for judicious use of all inputs particularly pesticides, fertilizers and irrigation water
- b. Measures to provide required capital by financing/loaning interventions
- c. Research and efforts for Bio-intensive IPM ensuring minimum use of pesticides
- d. Interventions and capacity building for use of modern technology like drones, precision land leveling etc.

3. Source of multiplication for Pink Bollworm

This was the major issue for which early sowing of cotton was banned in Punjab in year 2017. It was argued by the department that early sown cotton provides an easy carryover of the pest in late February or early March.

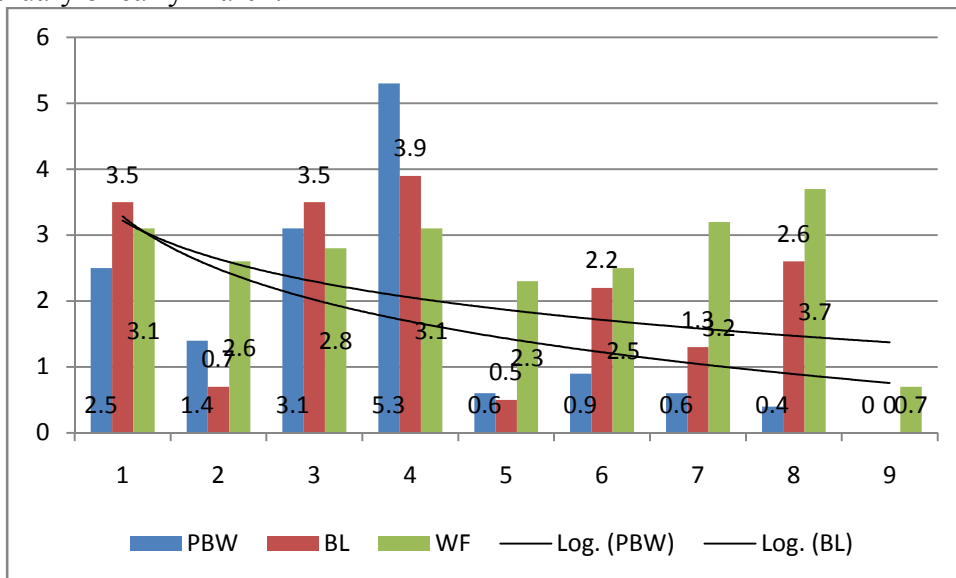


Fig # 5. GRAPH SHOWING COMPARATIVE PEST PRESSURE IN DIFFERENT FORTNIGHTS OF THE YEAR 2017 IN DISTRICT VEHARI

If this situation is viewed with another angle it seems like this.

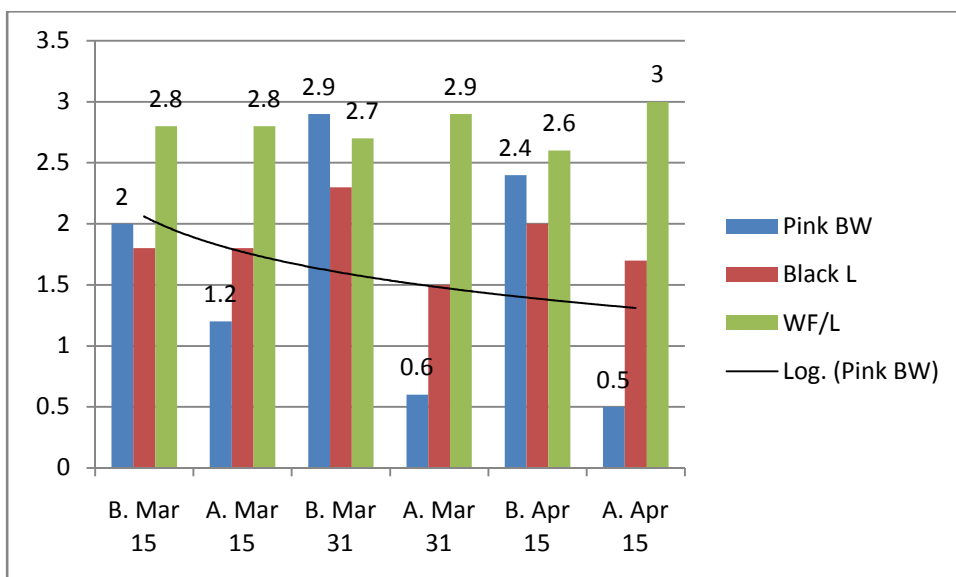


Fig # 6. GRAPH SHOWING COMPARATIVE PEST PRESSURE IN DIFFERENT PERIODS OF THE COTTON SOWING IN YEAR 2017 IN DISTRICT VEHARI

It is obvious from the graph that the trend of pink bollworm infestation goes on decreasing with delay in sowing date. The difference between the two types of cotton sown before and after March 15, 2017 in the present data is minimum, which goes on increasing when we bifurcate the surveyed fields before and after March 31 and April 15 of the same survey (2017). The graph indicates that fields sown before March 15, have undergone the similar level of infestation as the cotton fields sown after that date. Whereas, whitefly has not shown much difference when bifurcated on different dates of sowing, that is its infestation is more or less independent of the date of sowing.

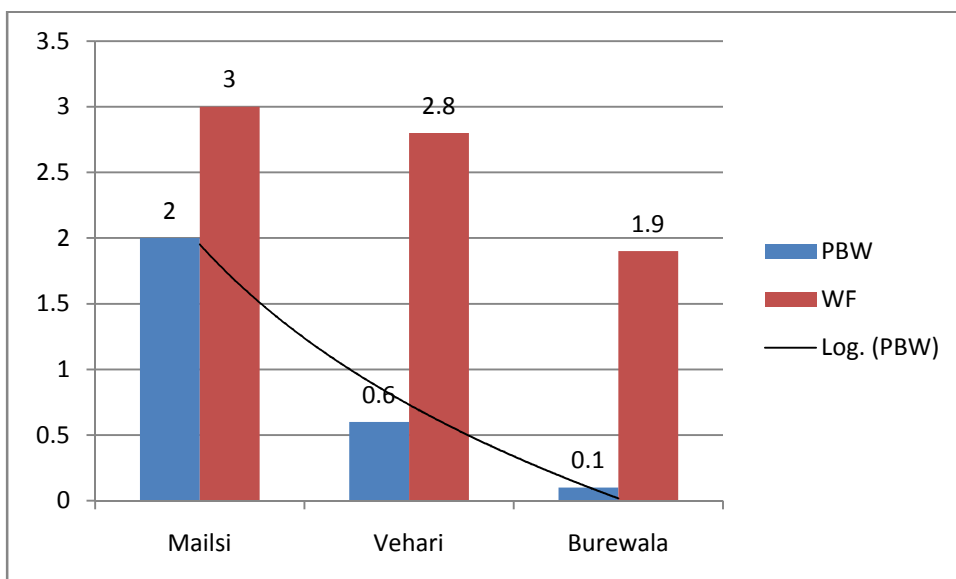


Fig # 7. GRAPH SHOWING COMPARATIVE PEST PRESSURE IN THE SURVEYED FIELDS OF DIFFERENT TEHSILS IN YEAR 2017 IN DISTRICT VEHARI

Now if we observe the situation on the basis of locality, it obviously supports the assumption that the localities which had more area under early sown cotton have been subject to more infestation of PBW, but it is also supported by general observations, but there are following cautions which must be kept in mind before taking these assumptions as a solid result of this exercise(Fig. 7).

1. This data is not random, rather it is selected for the particular localities (where ever early cotton was sown) and results may be biased
2. The number of observations is not similar (ie. Mailsi 53, Vehari 23, and Burewala 9)
3. The percentage infestation was calculated on the basis of picked as well as unpicked and immature fruiting so most of the infestation found in early sown cotton in (August to October, the period of survey) was on the picked bolls, a forensic survey of all the fruiting parts of the plant had revealed it.
4. If the infestation on picked dried fruiting parts was excluded, the remaining infestation was like the field of other localities.

Anyhow, it can not be over ruled at all, that infestation was prevailing due to early sown cotton and a common farmer ignored its early attack and did not take any remedial measures due to ignorance or little or tolerable economic value of damage and hope of production in main fruiting season which was yet to come. On the same time the graph shows that whitefly is also independent of the locality factor. The minor difference in infestation of whitefly is due to difference of cotton under cultivation (availability of host).

Possible Solution:

1. The effects of PBW infestations can be minimized by banning its cultivation before a permitted date (In my suggestion it should be March 15).
2. In May the infestation of PBW may appear on flowers, after 3 weeks of its appearance on flowers continuous spraying can save the cotton of farmers from infestation of this pest because luckily up till now, even after lapse of 40 years no resistance in PBW has been reported so far from anywhere in the world.
3. Awareness may be created among farming community to destroy its overwintering places ie. left over bolls, in fields and in cotton sticks, garbage of ginning factories
4. The early growers may be registered for close surveillance of pests and installation of PBW traps on subsidized rates
5. The infested fields if any may be treated to minimize its wide dispersal and multiplication

4. More environmental pollution, (more number of sprays)

5.

The surveys revealed that early cotton received more sprays of pesticides as compared to seasonal one. It is a source of environmental pollution. When analyzed critically it was observed

in the surveyed that it is true not only for early cotton but vegetables and fruit crops which is matter of serious concerns and exports to health concerned countries.

Possible Solutions:

1. This matter should be addressed properly incorporating Bio-intensive IPM techniques and following the protocols of developed countries.
2. A consistent research in this regards on transgenic varieties or import of Pink resistant Bt-cotton varieties
3. Consistent research on manipulation of naturally existing biological resource (beneficial fauna) or Bio-intensive IPM cotton as well as vegetables and fruits