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# Basmati rice contract farming trends, challenges and opportunity for bayer

## Vikash and Megha Goyal

**Abstract**
In the present study an attempt has been made to analyze the fitment of BCS portfolio in exportable basmati rice production and perception of farmers and retailers about adoption and expedition of contract farming of basmati rice. The required data was collected from 300 farmers and 20 dealers of agro inputs operating in Ratia region of Fatehabad district (Haryana).It was found that 21% farmers were having the problem of Bakane disease. In some field it was severe whereas in some field it was not. It was also found that 18% farmers are using preventive measures like seed treatment, spray before incidence of pest/disease to prevent the upcoming incidence of pest/diseases and 16% farmers are using over dose of fertilizers/pesticides. The study revealed that farmers who are using Bayer's product or complete using BCS portfolio are having very good growth of paddy and there is no problem of disease/pest in their fields. Some of farmers gave opinion that high temperature give rise to incidence of Bakane disease and high humidity give rise to incidence of sheath blight in paddy. Further it was found that 23% farmers visited the retailers and describe the symptoms of disease/insect pest attack and retailers provide those pesticides accordingly. The study also revealed that farmers having 0-15 acres of land are not using Bayer's product due to higher prices. However, the farmers having land holding 20-50 acres or 60-90 acres are using Bayer's product and they having very good results. On the whole it was concluded that BCS portfolio is fit for exportable basmati rice production.

**Keywords:** Basmati rice, pesticides, bayer crop science (BCS) portfolio, contract farming

## Introduction
The 2017 India paddy production was 168.5 million tonnes. India, has the lead and major share in this production, (FAO, 2017) [2]. India is the world's second largest producer of Rice and first largest exporter of Basmati rice in the world (APEDA, 2015) [1]. The agricultural marketing and agri-business system need institutions and innovations, to create and develop different marketing strategy for increasing in agricultural production. There are various marketing models, and among these are contract farming including those led by individual, or by farmer groups, or by cooperatives, and by various types of private processing sector that develop backward linkages with growers.

Basmati rice, a novel product, is characterized by its unique grain size, aroma, fragrance and cooking qualities with sweet taste and soft texture. Agro climatic conditions of a specific geographical area as well as method of its harvesting, processing and aging attribute to these features. India is the largest producer and exporter of Basmati rice. India exports 3.2 million metric tons of basmati rice to Middle Eastern countries, Europe, as well as US and Canada (Anonymous, 2019). The countries importing most basmati rice are Saudi Arabia, UAE, Iran, Kuwait, UK and the USA. Along with exports, domestic consumption of basmati rice is also growing fast, particularly in the branded basmati.

**Product Group: Basmati Rice**
**Qty in MT; Value in Rs. Crore**

Table 1 represents the exported quantity of basmati product to foreign countries and the revenue generates from export by India (APEDA).

Traditionally, Indian basmati was produced in the Himalayan foothills, but now production has expended to Haryana, Punjab, UP, MP. With liberalization of the economy during 90s the government undertook several initiatives to enhance its exports such as financial assistance to exporters to improve basmati rice quality, packaging and brand promotion, encouragement for participation in international fairs, organize buyer-seller meets, etc. As a long term measures, later several state governments made amendments in the Agricultural Produce Marketing Committee (APMC) acts to open the opportunities for contract farming because of the existence of Land Ceilings Act which stipulated that agribusiness firms cannot own and cultivate land for raw materials.

This has drawn several corporate groups, MNC's, agro-input agencies and other organizations for contract farming though its models have varied over crops, regions and the sponsoring organizations. Global as well as in developing countries food consumption patterns have been shifting from food grains to high value crops/animal products while in the developed countries from animal/fish to crops and within the cereals sub group from wheat to rice. Thus the changing food consumption patterns have provided opportunities for basmati rice, a higher value crop, expanded .market sizes both domestic and international while the signing of WTO treaty has opened up global markets. Coupled with it, changing government policies both at the central and state levels have enabled the industry to introduce farm level changes and build up its competitive edge. As a result, average share of basmati rice exports in total agricultural exports that stood at 5.80% during the period 2001-02 to 2007-08 has suddenly jumped to 11.03% during 2008-09 and further to 12.11% during 2009-10. Famous brands of basmati rice are Lal Qilla, Double Diamond, Daawat, Kohinoor, Doon, Annapurna, etc. Although over the last few years, exports have been steadily growing, crop protection product residues in Basmati rice are becoming a more important issue and creating a challenge for Basmati exporters and the industry as a whole. Its objective to develop and implement effective solutions that improve the yield and quality of basmati rice and manage the level of residues. The aim was to raise awareness at a farm level about food safety as a focus area. Basmati rice growers are challenged in producing high-quality rice through higher broken grain percentages, grain discoloration, relatively low yields and the residue management of crop protection products. Last but not least, food safety management in general is getting more and more important for rice.

Thinking about the global food chain means considering all the hands involved, and it means thinking about all the people behind it and the demands they have to meet every day. The Food Chain Partnership expresses our belief that together with our partners in the food value chain we can build relationships that benefit everyone. There are now more than 240 Food Chain Partnerships in over 30 countries covering important fruit, vegetable and other crops.

**Who is involved?**

**Food chain update:** Table 2 represents the partner companies who are involved in exporting of Basmati Rice with Bayer Crop Science at global level.

It was agreed to develop and implement effective solutions that improve the yield and quantity of basmati rice and manage the level of residues. Implementing good agricultural practices and respecting the principles of sustainable agriculture were natural prerequisites for this project. Furthermore, the aim was to raise awareness at a farm level about food safety as a focus area.

For such solutions a special project was initiated by Bayer Crop Science entitled "Basmati Rice contract farming trends, challenges and opportunities for Bayer" under which the goals are:

1. To evaluate fitment of BCS portfolio in exportable basmati rice production
2. In depth analysis of the perception of farmers, retailers about adoption and expedition about contract farming of Basmati Rice.

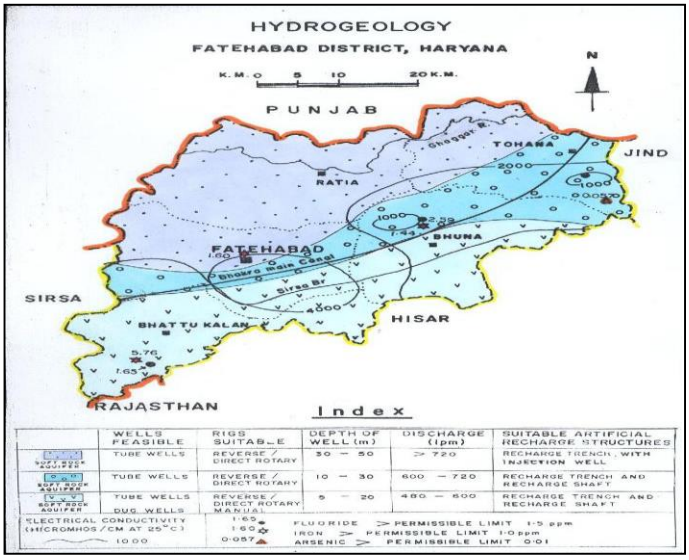
The major problems faced by the farmers in paddy cultivation were bakane disease, incidence of pest attack like leaf folder, stem borer, hoppers attack and various diseases like neck blast, collar blast, leaf blast, sheath blight can be challenges to basmati rice production if timely not take care.

Bayer crop science is India's leading crop protection company with more than 100 years of experience in the Indian market. Through its innovative food chain partnership model Bayer crop science provides not only innovative products but also comprehensive crop solutions to Basmati growers, helping them in the quality production of basmati rice. The company focus is on training these farmers in disease and pest management and the safe use of crop protection products. (www.bayer.com)

**Research Methodology**

**Study area**

A study was conducted in Ratia region of Fatehabad district (Haryana) under the project contract farming of basmati rice-trends, challenges and opportunity for Bayer Crop Science. Fatehabad district has high agricultural activities is bounded by 28048'15" to 29017'10" North latitudes and 76028'40" to 77012'45" East longitude covering an area of 2490 sq.km. Fatehabad is one of the smallest districts in the Haryana State and covers 5.69% area of the state.




Map (Hydrogeology of Fatehabad district Haryana)

The normal annual rainfall of the district is 373 mm which is unevenly distributed over the area in 22 days. The south west monsoon sets in from last week of June and withdraws in end of September, contributed about 80% of annual rainfall. July and August are the wettest months. Rest 20% rainfall is received during non-monsoon period in the wake of western disturbances and thunder storms. Generally rainfall in the district increases from southwest to northeast.
Normal Annual Rainfall: 373 mm
Normal monsoon Rainfall: 297 mm

**Temperature**
Mean Maximum: 41.6 °C (May June)
Mean Minimum: 5.5 °C (January)
Normal Rainy days: 22

**Physiv ography**
The district is located in the Indo-gangetic alluvial Plains, is by and large flat and plain flat terrain is interrupted by the randomly located sand dunes along the Ghaggar river. The land slopes from north to south with elevation difference in eastern part of the district from North to South is about 6m (222-216m above m.s.l.) In the rest of the district it is about 7 m (214.6-207.6m amsl) The two above said slopes result in a master slope towards south west with an average gradient of 0.27m/km. The soils of the district are sandy loam to loamy sands.

**Research design**
The descriptive research design was chosen and for this appropriate objectives were laid down. The research was of survey type and so much importance was given on the technicalities of sampling, the method of constructing questionnaires, interviewing the respondents, editing, coding, and tabulation of data and the statistical techniques to analyze data.

**Sampling and data collection methods**
Convenient sampling technique was used to survey of 300 farmers and 20 Retailers. The survey was conducted between June and July, 2019. All interviews and discussions with farmers were conducted in the main local language except in special cases where the respondent could not understand the language, Punjabi or interpretation was used. Each interview lasted an average of 30 minutes.
Questionnaires were designed to capture information such as farmer profile, source of information, schedule of spray, influence of purchase, facilities of BCS used by farmers, retailers profile and other questions summarized in appendix. In each village, the enumerators stopped conducting the questionnaires when there was no new information especially pertaining to crops grown. This approach resulted in a total of 300 farmers and 20 retailers being interviewed.
The data that is obtained from farmers and retailers was properly decoded and used for analysis. The data was analyzed in MS Excel and then all the data came out as a prefect result. Data includes facts and figures, which are required to be collected to achieve the objectives of the project in order to understand the perception of farmers and retailers about contract farming of basmati rice.

**Survey procedure**
1. Form team for designing and implementing the survey.
2. Develop questionnaire.
3. Find out area for survey.
4. Determine the sample size.
5. Make the corrections in the questionnaire.
6. Arrange question in proper sequence.
7. Take print of the questionnaire.
8. Then contact to the respondents in the field.
9. From this collected data sort out the useful data.
10. Then do the analysis and interpretation and come to result.

**Results and Discussion**
The knowledge about contract farming by farmers is studied and results are presented in Figure 1 represents that the farmers, have not any knowledge of contract farming are 242 (81%), having knowledge of contract farming are 30 (10%), those farming having somewhat knowledge of contract farming but they are not sure about this fact are 20 (7%) and those farmers having little knowledge about contract farming of basmati rice are 8 (2%).
The source of information about Bayer's product by farmers are studied and results are presented in Figure 2 represents that 20 (6.67%) farmers get to know about Bayer's product from neighbor farmers, 40 (13.33%) farmers from advertisement, 60 (20%) farmers from retailer, 90 (30%) farmers from meeting and 95 (31.67%) farmers get to know about Bayer's product from all above sources.
Perception of farmers about Bayer's product is studied and results are presented in Figure 3 represents that about 130(43.33%) farmers are satisfied by using of Bayer's product, 50 (16.67%) farmers are highly satisfied, 10 (3.33%) farmers are not satisfied and 110 (36.67%) farmers having no any idea about Bayer's product because they are not using it.
Results of Regent GR/Ultra in the field of paddy are found as per discussion with farmers and results comes out in Figure 4 represents that 80 (26.67%) farmers found very good effect of Regent GR/Ultra (insecticide) in their field, 95 (31.67%) farmers found good impact and 125 (41.67%) farmers are not using this insecticide.
The usability of BCS portfolio in the farmer's field is studied and results presented in Figure 5 represent that 30 (10%) farmers are completely use package of BCS portfolio, 40 (13.33%) farmers are using but not adopted every year, 120 (40%) farmers are rarely using means they are not using always but sometimes they do, 110 (36.67%) farmers are not using BCS portfolio but they are using some product of it.
Table 3 & 4 represents the spray schedule that was approved by Punjab Agricultural University (PAU) which is used by the farmers as BCS portfolio
Source of information and influence of purchase of various products by farmers are studied and results presented in Figure 6 represents that 150 (50%) farmers get the information and influence of purchase from meeting that were organized by company, 50 (16.67%) farmers get information from advertisement and 100 (33.33%) farmers influenced by discussion with neighbor farmer and company's staff.
Farmer's Objective of farming are studied and results presented in Figure 7 represents that The objective of farming by farmers to raise the income & get the good price of their crop produce, to get the good production viz. biological yield and grain yield and to complete the basic family need are in 120 (40%) no's, 81 (27%) no's and 99 (33%) no's of farmers respectively.
Challenges to Basmati rice production by farmers are studied and results are presented in Figure 8 represents that 87 (29%) farmers having problem of bakane disease in their paddy field, 51 (17%) farmers having leaf folder problem, 42 (14%)

farmers having stem borer problem, 66 (22%) farmers having neck blast problem and 93 (31%) farmers having problem of hoppers which are challenges to basmati rice production as per discussion with farmers.

Spray/herbicide/pesticides used by farmer are studied as per discussion with farmers and results are presented in Table 5 (represents the Spray used by farmers).

Most sailing pesticides are found and results presented in Figure 9 represent the pesticides which are most sales to decreasing trends of fewer sales as per discussion with retailers.

Most moving brands in markets are studied and results presented in Figure 10 represents the most moving brands in the market as per discussion with retailers

The reason for low business with Bayer by discussing with retailers and results found are presented in Figure 11 represents that 9 (45%) retailers thinks that the price of Bayer's product is very high and they can't afford it, 4 (20%) retailers thinks that there is low margin profit over Bayer's product and 7 (35%) retailers thinks that the sale of Bayer's product is low due to their high price. These are the reason for low business by retailers with Bayer.

There are various challenges while doing Bayer business for retailers are studied and results are presented in Figure 12 represents that As per discussion with retailers it was found that Trading of the products is a great challenge while doing Bayer business i.e. think by 12 (60%) retailers and Prices also a challenge while doing Bayer business i.e. think by 8 (40%) retailers.

## Conclusion

During survey it was concluded that most of the farmers having problem of bakane disease. It was found that the farmers who are using Bayer's product or complete BCS portfolio having very good growth of paddy and there was no any problem found in their fields. During survey of retailers it was concluded that most of farmers get to know about pesticides from retailers. The farmers just came tell the disease/pest attacking symptoms and retailer give them the pesticides as per own desire In 1401 variety of basmati rice there is heavy incidence of bakane diseases as compared to other diseases. During survey it was found that the farmers having 0-15 acres of land was not using Bayer's product due to high prices of Bayer's product as per discussion with farmers. The farmers having land holding 20-50 acres or 60-90 acres are using Bayer's product and they having very good results. After the survey it was concluded that BCS portfolio is fit for exportable basmati rice production. In depth analysis of the perception of farmers and retailers about adoption and expedition about contract farming of Basmati Rice was founded quite well.

A. B. C.

D. E. F

**Fig 2:** Major disease/insect pest of rice (a) Bakane disease caused by *Gibberella fujikuroi* (b) Leaf blast caused by *Magnaporthe grisea* (c) Bacterial Leaf Blight caused by *Xanthomonas oryzae* (d) Stem borer *Scirpophaga incertulas* (e) Leaf folder *Cnaphalocrocis mainsails* (f) Ca & Mg deficiency

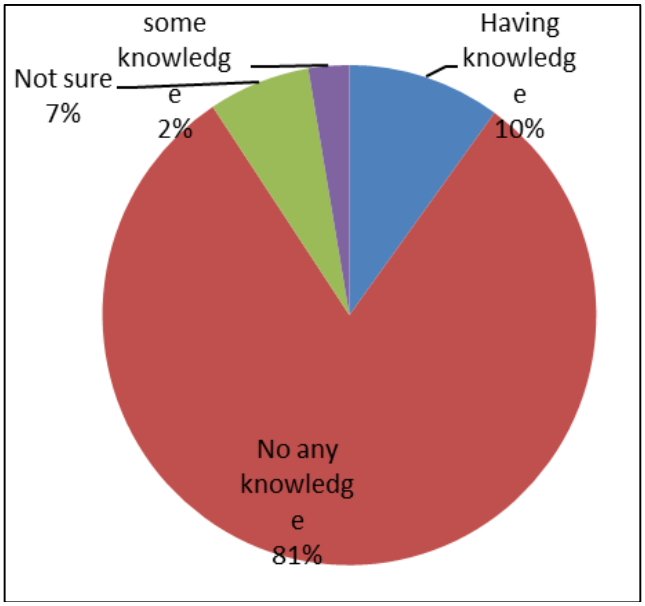



**Fig 1:** Farmer's Knowledge about contract farming

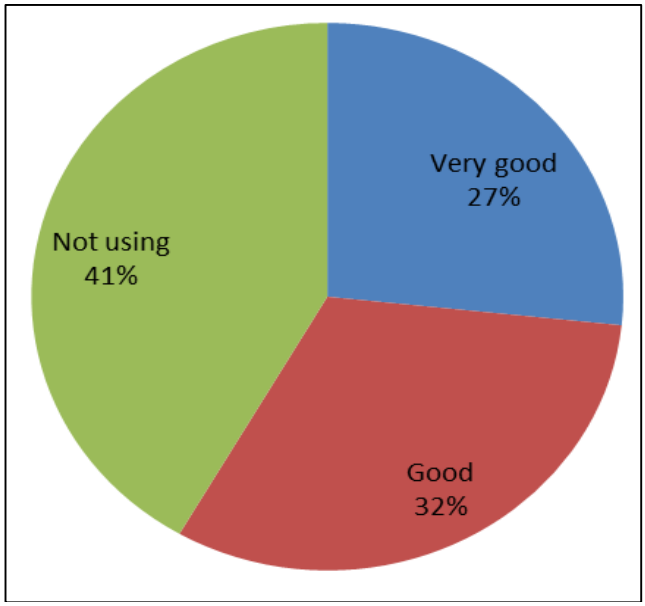



**Fig 4:** Results of Regent GR/Ultra in paddy field

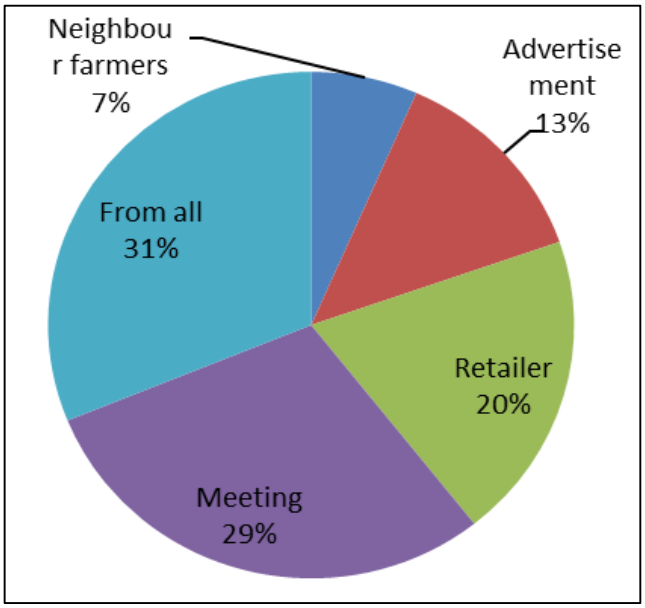



**Fig 2:** Source of information for farmers about Bayer' product

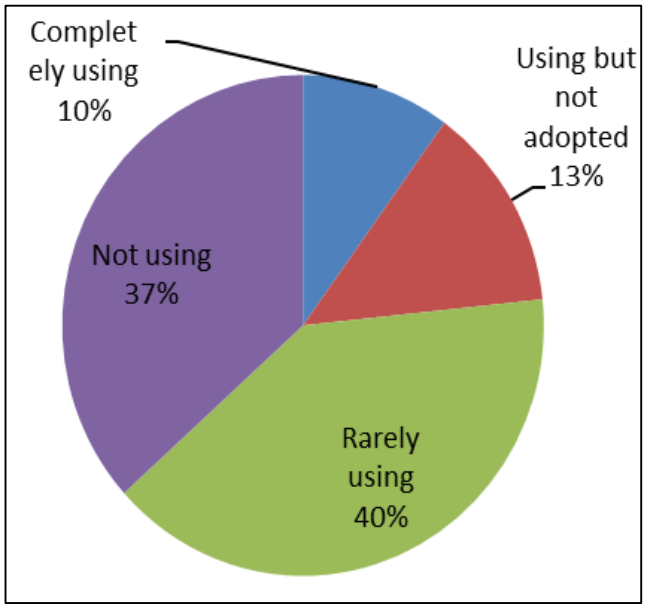



**Fig 5:** Usability of BCS Portfolio by farmers to their fields

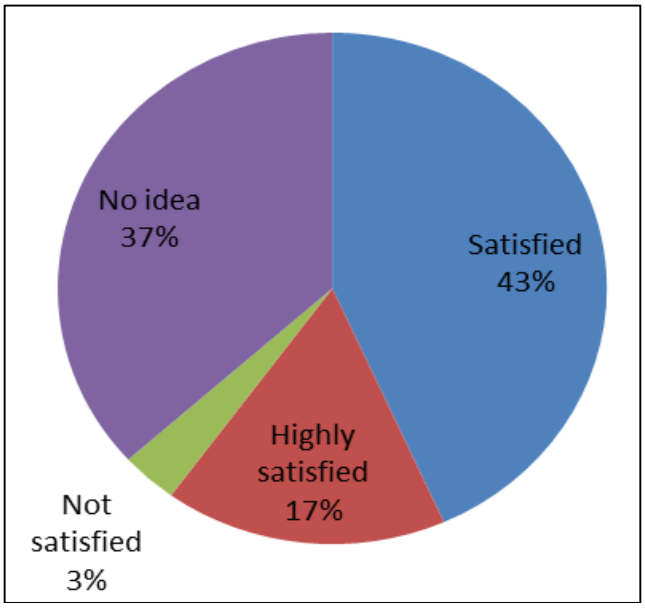



**Fig 3:** Perception of farmers about Bayer's product

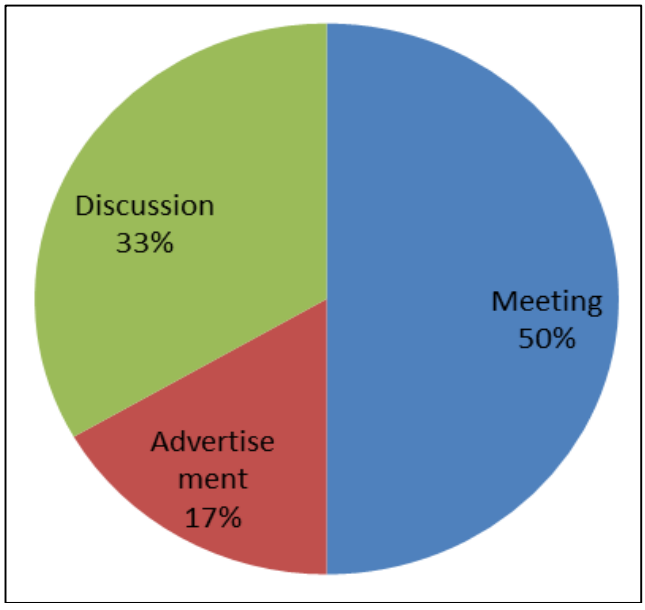



**Fig 6:** Influence of purchase to farmers

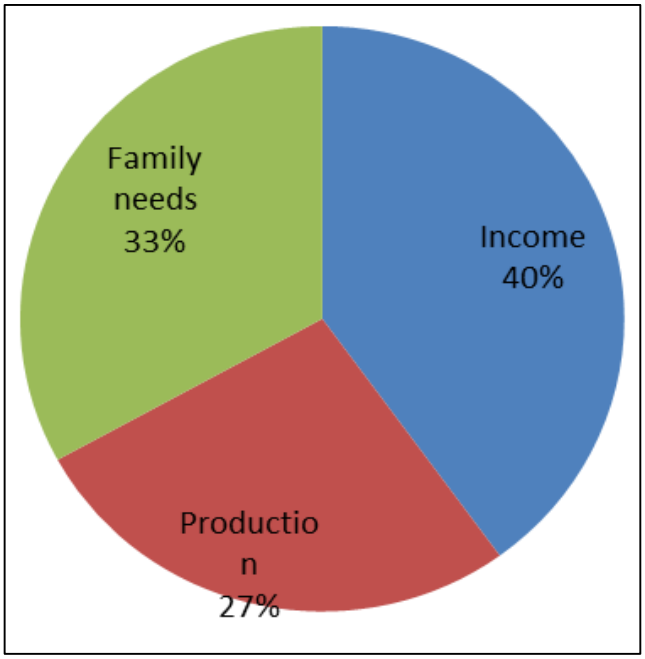



**Fig 7:** Objective of farming for farmers

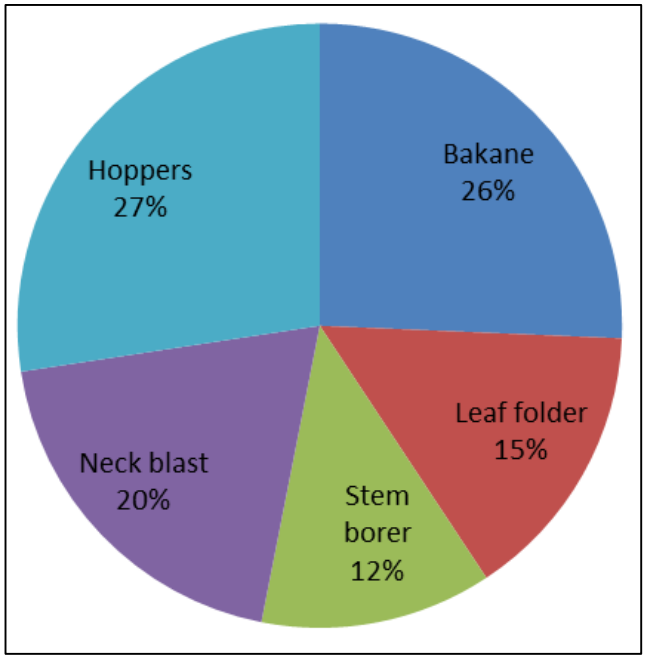



**Fig 8:** Challenges to farmers for basmati rice production

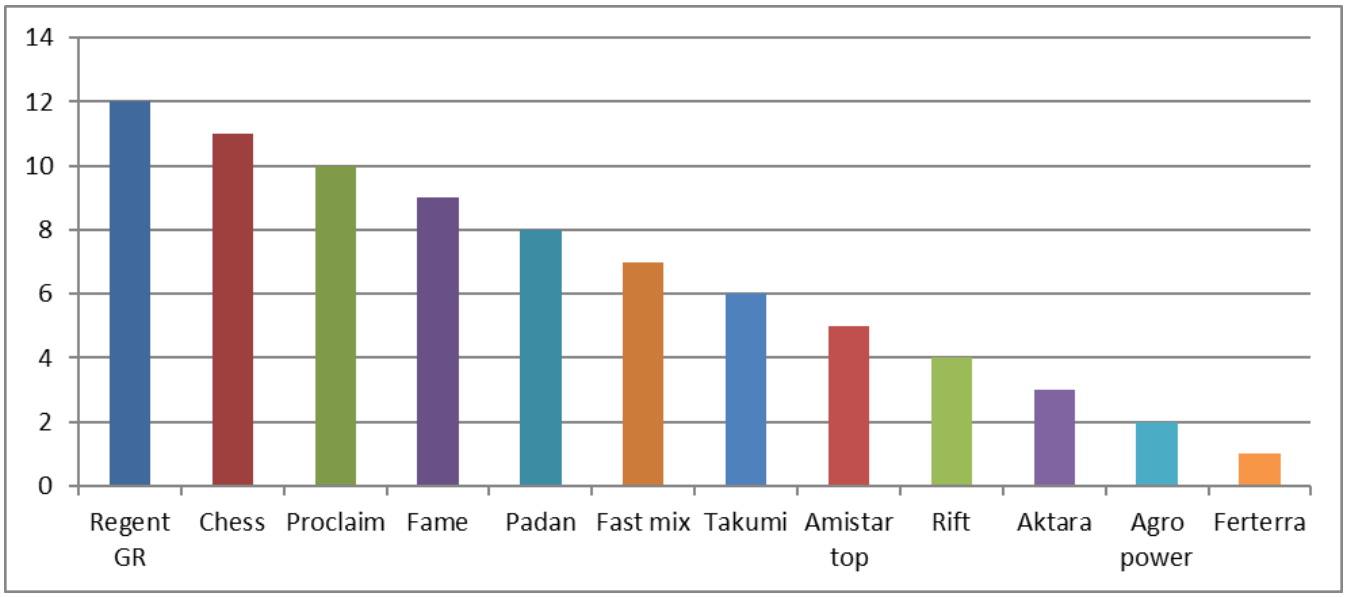



**Fig 9:** Most sailing pesticides in market

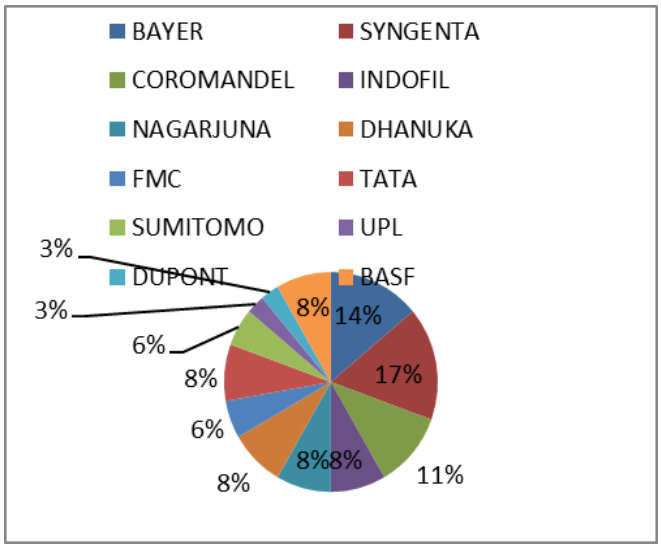



**Fig 10:** Most moving brand in market

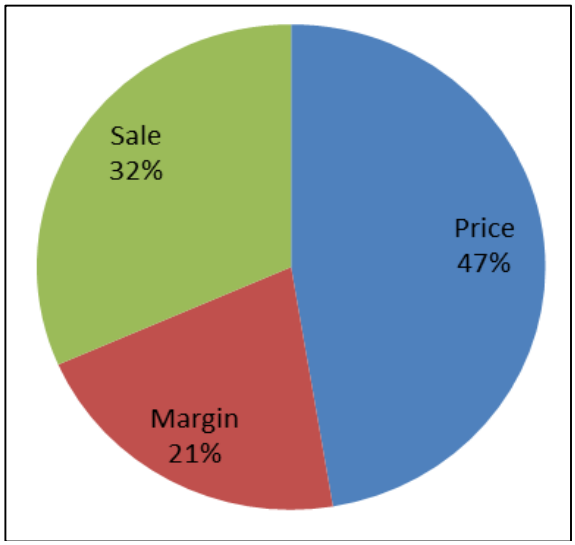



**Fig 11:** Reason of low business with Bayer by Retailers

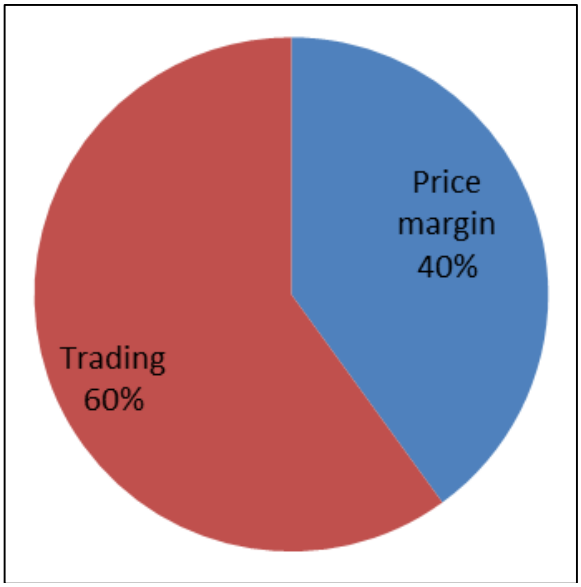



**Fig 12:** Challenges while doing Bayer's business by Retailers

**Table 1:** Basmati Rice (Export Data 2010-2019) APEDA

| Year | Qty | Rs. Crore |
|---|---|---|
| 2010-11 | 2370658.39 | 11354.63 |
| 2011-12 | 3178174.43 | 15449.6 |
| 2012-13 | 3459898.93 | 19409.39 |
| 2013-14 | 3757271.42 | 29299.96 |
| 2014-15 | 3702260.07 | 27597.89 |
| 2015-16 | 4045822.29 | 22718.6 |
| 2016-17 | 3985195.6 | 21512.91 |
| 2017-18 | 4056758.62 | 26870.17 |
| 2018-19 | 4414584.16 | 32804.3 |

**Table 2:** Food Chain Update

| Crop segment | Name of partner company | Total area (acres) | Location |
|---|---|---|---|
| Basmati rice | LT Foods | 10,500 | Kaithal,Krukshetra, ladwa,Radaor |
| " | Kohinoor McMcormick | 3,000 | Sonipat and Jind |
| " | Dunar Foods | 3,000 | Amritsar and Narwana |
| " | Punjab rice exporter association | 20,000 | Amritsar and Taran Taran district |
| | Total | 36,500 | |

**Table 3:** Spray Schedule

| DAT | Target segment | PR 126 | PR121,114,127,47 | PUSA 44 | Basmati 1121 |
|---|---|---|---|---|---|
| 0-3 | Weeds | Topstar | Topstar | Topstar | Topstar |
| 15-25 | Stem borer/PGR | Regent GR 8kg/acre | Regent GR 8kg/acre | Regent GR 8kg/acre | Regent GR 8kg/acre |
| 45-55 | Stem borer & leaf folder + sheath blight | Fame 30ml + Folicur 250ml | Fame 30ml + Folicur 250ml | Fame 30ml + Folicur 250ml | Fame 30ml + Folicur 250ml |
| 66-75 | Sheath blight/brown spots & plant hoppers | Nativo 160gm+ Glamore 50gm | Nativo 160gm+ Glamore 50gm | Nativo 160gm+ Glamore 50gm | Nativo 160gm+ Glamore 50gm |
| 85-95 | Neck blast/Dirty panicle & plant hopper | Need based | Need based | Folicur 250ml +Glamore 50gm | Nativo 160gm + Glamore 50gm |

Basmati project protocol: approved by PAU

**Table 4:** Basmati Project Protocol with PAU

| DAT | Target segment | Communication (ETL level) | Product |
|---|---|---|---|
| 0-3 | Weeds | Pre-emergence | Topstar |
| 15-25 | Stem borer/PGR | 2% dead hearts, 15-20 dead hearts | Regent GR |
| 35-60 | Stem borer & Leaf folder + sheath blight | Damage leaf 10%, 400 damage leaves/acre | Fame |
| 60-90 | Sheath blight/Brown leaf spot | On the appearance of initial disease and repeat in 10 days interval | Folicur Nativo |
| 65-85 | Plant hopper | 5 nymphs/adult per hill spot treatment in high infestation area/patches | Confidor |

**Table 5:** Spray used by farmers

| **Herbicides** | **Pre-emergence** | | | **Post-emergence** | | |
|---|---|---|---|---|---|---|
| | **Rift** | **Topstar** | **Fast mix** | **Nomnigold** | **Nellogaurd** | **Council active** |
| No. of farmers | 130 | 110 | 180 | 180 | 110 | 10 |
| Insecticides | Fame | Proclaim | Takaumi | Coragen | | |
| No. of farmers | 100 | 90 | 80 | 30 | | |
| | Regent GR | Padan | Ferterra | Virtako | | |
| No. of farmers | 250 | 180 | 120 | 50 | | |

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