IMPACT: International Journal of Research in Business Management (IMPACT: IJRBM)
ISSN (P): 2347-4572; ISSN (E): 2321-886X
Vol. 6, Issue 7, Jul 2018, .37-42

MARKET POTENTIAL OF AGROCHEMICALS USED IN MANGO AND OKRA FROM VALSAD AND SURAT DISTRICTS

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Received: 13 Jul 2018 **Accepted:** 17 Jul 2018 **Published:** 31 Jul 2018

ABSTRACT

Agriculture is the backbone of Indian economy. Agriculture sector needs to be on the boom if a country like India wants to feed its increasing population but it cannot be possible without solving the problems of pests, which dwindles the crop production. That's when the role of agrochemical sector comes into play. The rising population of our country demands that our agricultural practices are sufficient enough to feed the rising population. This process will lead to effective utilization of various agrochemicals that include fertilizers, pesticides, herbicides, plant growth regulators etc. The present study was conducted to measure the market potential of agrochemicals. 200 farmers were chosen for the study by purposive sampling. The present study has been conducted for mango in Valsad district and in Surat district for Okra. The study measures the market preference of farmers regarding agrochemicals used in mango and okra from Valsad and Surat districts. Majority of the farmers used Imidachloprid against the attack of mango hoppers. The study found that other insecticides such as Acephate, Thiomethoxam, and Fenobucarb were also used by the farmers. White fly is a major pest in okra and vector of yellow vein mosaic virus. To combat white fly infestation, insecticides such as Dimethoate, Thiamethoxam and Monocrotophos was used. From the study, market potential recorded for pesticides in mango was 40,481.8382 liters and in okra was 29,457.35 liters.

KEYWORDS: *Agrochemicals, Market Preference, Pesticide Consumption, Market Potential*

INTRODUCTION

India is an agrarian country, and much of the population rely on agriculture as their principle means of livelihood. It has remained the backbone of the Indian economy and contributes for about 7.68% of the country's GDP. India's diversified climate, geographical patterns, and variation in crops including cereals, fruits, vegetables, spices and condiments make the country's agriculture sector unique. And because there are variations in all these aspects, an influence of pests and diseases becomes a crucial factor which needs to be tended to with precision. Modern practices for use of agrochemicals must be looked into. The crop protection market is growing strong in the past and is expected to grow further at a whopping 12% per annum. The market for agrochemicals is pushed further because of the need for increasing food production and expands the economic growth of the country. The agrochemicals can be broadly classified into the following five types:

- **Insecticides:** Insecticides (also called pesticides)are agrochemicals that protect the crops from the pests by destroying them or by preventing their attack on the specific crop.
- **Fungicides:** Most of the crops are susceptible to fungi which are the causal organisms for multiple diseases. Fungicides are used against the attack of fungus and inhibit multiplication of fungal spores. This further helps in maintaining the quality, shelf life and improves the crop production adequately.
- **Herbicides:** Herbicides (also called as weedicides) are used to kill unwanted plants that grow around the vicinity of the main crop. They are of two types - selective and non-selective. Selective herbicides kill targeted plants only and leave the main crop unscathed, while non-selective herbicides help in the prevention of upcoming weeds before the main crop is sown or planted in the soil.
- **Bio-Pesticides:** Bio-pesticides are manufactured from natural sources. This may include plant extracts, substances from animals (including microorganisms such as bacteria). The positive side of bio pesticides is that they are environment-friendly. This category of agrochemicals has huge market potential due to their nontoxic nature compared to chemical formulations of crop protectants.

RESEARCH METHODOLOGY

Valsad and Surat have the highest cultivation of mango and okra respectively. Thus that area was selected purposively. For the survey, a semi- structured questionnaire was used. The sampling unit were farmers. The questionnaire contained questions related to socio economic profile of farmers, farmers usage of agrochemicals and research questions. Total 200 respondents were selected. By purposive sampling method, 100 Mango farmers and 100 Okra farmers were selected from Valsad and Surat districts respectively. Data were analyzed using standard tools like frequency distribution, average, percentage, tabular representations in MS Excel keeping in view the stipulated objectives of the study. Specifically for calculating market potential following formula was used: Market potential = Average use of pesticides*Total cultivated area under the crop; where, Average use of pesticide= Total consumption of the pesticide (as per the survey)/Total area of the crop under cultivation (as per survey)

DATA ANALYSIS

Table 1: Profile of Sampled Farmers

Age (In Years)	**Frequency**		**Total**		**Percentage (%)**
	Mango	**Okra**			
Below 30	8	6	14		7
30-45	45	28	73		36.5
45-60	45	66	111		55.5
Above 60	2	0	2		1
Land Holding	**Mango**		**Okra**		**Percentage (%)**
	Area(acre)	**No. of Farmers**	**Area(acre)**	**No. of Farmers**	
Marginal	17.05	10	16.1	9	9.5
Small	72.94	23	93.7	28	25.5
Medium	202.6	31	250.85	51	41
Large	714.8	36	86	12	24
Total	**1007.39**	**100**	**446.65**	**100**	

Table 1 Contd.,			
Mango	**Percentage**	**Okra**	**Percentage**
Kesar	78%	Prince	44%
Alphonsa	65%	Lavanya	4%
Langra	1%	Radhika	17%
Dasheri	13%	Jani	10%
Totapuri	10%	Venus plus	32%
Rajapuri	17%	Taj	28%
Sonpari	4%	Samrat	67%
Pairi	18%	Singham	35%
		Shikar	26%

The profile of the sampled farmers is presented in Table 1. The table reveals that 55.5 percent of farmers belong to the age category of 45-60 years. From the study it was seen that out of 100 mango farmers from Valsad, 36 were large farmers whereas 51 okra farmers from Surat were medium farmers as per the land holdings. The total cultivated area in mango and okra as per the survey was 1007.39 acres and 446.65 acres respectively. The table also shows the various varieties of Mango and Okra cultivated in the study area. Multiple responses were recorded for this analysis and it was found that in Mango, *Kesar* (78%) was a widely grown variety and in Okra, *Samrat* (67%) wasthe maximum cultivated variety.

Table 2: Seasonal Expenditure of Agrochemicals Made on Crops

Parameters (in Rupees)	**f_1**	**Parameters (in Rupees)**	**f_2**
	Mango		**Okra**
Less than 20,000	36	More than 10,000	56
20,000-40,000	48	10,000-8000	25
40,000-60,000	16	8000-6000	17
More than 60,000	0	Less than 6000	2

The seasonal expenditure of agrochemicals made on Mango an Okra is presented in Table 2. The analysis revealed that 48 mango growers spent Rs.20,000 to Rs.40,000 for agrochemicals whereas 56 okra farmers spent more than Rs. 10,000 for agrochemicals. The land holding and seasonality of crops owed to such expenditure difference in Mango and Okra.

Table 3: Pest Infestation: Multiple Responses

Pest In Mango	**Percentage**	**Pests In Okra**	**Percentage**
Mango hopper	88%	White fly	100%
Mango stem borer	41%	Fruit and shoot borer	58%
Mealy bug	40%	Fruit borer	52%
Bud mite	27%	Mites	49%
Red ant	22%	Aphid	33%
Aphid	19%		
Fruit fly	18%		
Thrips	8%		

Table 3. reveals the pest infestation in mango and okra. Multiple responses were recorded for the analysis. The major pest found in mango was mango hopper (88%). From the study, it was found that white fly infestation was maximum (100%) White fly is the root cause of the viral disease ‘Yellow Vein Moaic Virus’.

Table 4: Pesticides used by Farmers in Mango: Multiple Responses

Pest	Pesticide	Farmers				Frequency
		Mar	Sm	Med	Lar	
Mango-hopper, thrips, aphid	Acephate 75% SP	5	12	20	21	58
	Imidachloprid	7	21	30	34	92
	Thiomethoxam 25%WG	3	2	11	5	21
	Fenobucarb	0	0	2	4	6
Mango stem borer	Quinalphos	3	2	6	7	18
Mealy bug	Dimethoate 30% EC	7	8	10	16	41
Bud mite	Ethion 50% EC	0	6	8	14	28
	Fenpyroximate 5%EC	0	0	0	2	2

Table 5: Total Pesticide Consumption as Per Survey In Mango

Pesticide	Recommended Dosage	Usage of Insecticide by Farmers (Lit)			
		Mar	Sm	Med	Lar
Acephate 75% SP	400 ml	2820	14336	51520	189520
Imidachloprid	45ml	591.75	2994.3	8874	30114
Thiomethoxam 25%WG	40 gm or ml	150	240	3000	3916
Fenobucarb	200 ml	0	0	2320	12260
Quinalphos	400 ml	1580	2800	16240	52600
Dimethoate	180	1953	4446	12780	55296
Ethion 50% EC	102, 400-600 ml	0	1948.2	5661	28468
Fenpyroximate 5%EC, Malathion 50 EC	120 gm/ml formulation	0	0	0	9120
TOTAL		**515548.45ml= 515.5485 litre**			

Where, Mar=Marginal, Sm=Small, Med=Medium, Lar=Large

Table 4. shows the major pesticides used by the farmer in mango. Majority of the farmers used *Imidachloprid* against the attack of mango hoppers. Since multiple responses were recorded for the parameter, it was also found that other insecticides such as *Acephate*, *Thiomethoxam*, and *Fenobucarb* were also used by the farmers. Table 5. shows the total pesticide consumption in Mango. Major pesticides used in mango has been recorded. The number of farmers (land holding wise) using these pesticides have been multiplied with the approximate pesticide dosage used by farmers and total pesticide consumed/used has been calculated.

Table 6: Pesticides Used by Farmers in Okra: Multiple Responses

Pest	Pesticide	Farmers				Frequency
		Mar	Sm	Med	Lar	
White fly	Dimethoate	9	17	24	5	55
	Thiamethoxam	0	0	28	11	39
	Monocrotophos	1	5	14	7	27
Shoot and fruit borer	Cypermethrin	2	4	36	6	48
	Deltamethrin 2.8% EC	1	0	5	3	9
Mite	Spiromesifen	5	22	43	4	74

Table 7: Total Pesticide Consumption as Per Survey in Okra

Pesticide	Dosage	Usage of insecticide by farmers			
		Mar	Sm	Med	Lar
Dimethoate	1000gm	16100	54700	116900	36000
Thiamethoxam	40ml	0	0	5892	3120
Monocrotophos	450ml	540	7245	31365	22500
Cypermethrin	300ml	450	4170	56385	12600
Deltamethrin 2.8% EC	250ml	500	0	6600	6500
Spiromesifen	250ml	1925	17475	53212.5	7000
TOTAL		**461179.5 ml= 461.1795 litre**			

Where, Mar=Marginal, Sm=Small, Med=Medium, Lar=Large

Table 6. shows the major pesticides used by farmers during the survey. To combat white fly infestation, insecticides such as *Dimethoate*, *Thiamethoxam* and *Monocrotophos* was used. The commonly insecticides against Shoot and fruit borer are *Cypermethrin* and *Deltamethrin. Spiromesifen* was used againstmites**.** Table 7. shows the total pesticide consumption in okra. Major pesticides used in okra during the survey have been recorded. A Total pesticide used has been calculated as done for Table 5.

Table 8: Year-Wise Cultivated Area of Mango and Okra in Valsad and Surat Districts Respectively

	Valsad			Surat		
Year	**2014-2015**	**2015-2016**	**2016-2017**	**2014-2015**	**2015-2016**	**2016-2017**
Cultivated Area (Hectare)	29988	31476	34624	10980	11627	12045
Average Area	32029.33 ha = 79112.4451 acre			11550.66 ha = 28530.1302 acre		

Source: https://doh.gujarat.gov.in/index.htm

For the calculation of market potential, primary as well as secondary data was used. Primary data has been used from Table 1, Table 4, Table 5, Table 6 and Table 7. Secondary data was used in the company product manual government websites and various agri-information portals. As per the records (previous three years) from the Director of Horticulture- Government of Gujarat, an average of the total cultivated area in Valsad for mango was 79112.4451 acre and that of okra in Surat district was 28530.1302 acre. Then, the market potential was calculated assuming that all the farmers of the study area used only pesticides. The market potential has been carried out by a specific formula which has been discussed in the methodology section.

For mango, the total area of cultivation in Valsad as per survey was 1007.39 acre (Refer Table 1.) and the total quantity of pesticides usage as per survey was 515.5485 liter (Refer Table 5). The total estimated Market Potential for Valsad district approximately for the year 2017-2018 obtained was 40,481.8382 liter.

For okra, the total area of cultivation in Surat as per survey was 446.65 acre (Refer Table 1.)and the total quantity of pesticides usage as per survey was 461.1795 liter (Refer Table7.).Total estimated Market Potential for Surat District approximately for the year 2017-2018 obtained was 29,457.35 liter.

CONCLUSIONS

This paper makes an attempt to study the market potential of pesticides in selected districts of Gujarat. i.e. Valsad and Surat for mango and okra respectively. Valsad is primarily an agricultural district with mango, paddy, and sugarcane as the predominant crops. About 36 per cent of land holdings are with large farmers under mango crop and the land

holdings of about 51 per cent under okra crop are with medium farmers. The total usage of the major agrochemicals in mango at Valsad district was 515.5485 liters. A white fly was found as a major pest in okra and vector of yellow vein mosaic virus. To combat white fly infestation, insecticides such as Dimethoate, Thiamethoxam and Monocrotophos was used. The total usage of the major agrochemicals in okra at Surat district was 461.1795 liter**.**It was estimated that the total market potential of pesticide purchased in Valsad and Surat district will be 40,481.8382 liter and 29,457.35 liter respectively. The findings of the study can help the organization to take strategic decisions for expanding the business and evaluating the current situation regarding usage of agrochemicals.

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