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Survey on aflatoxin awareness and assessment of Muktainagar Taluka in Jalgaon district of Maharashtra

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ABSTRACT

The survey on Aflatoxin Awareness And Assessment Of Muktainagar Taluka in Jalgaon District, (Maharashtra) was carried out during the year 2012-13 to create awareness among the people and assessment of it through questionnaire method. A questionnaire of fifteen different questions was prepared. In this survey study, data was collected from thirty four villages of Muktainagar Taluka. Total two hundred fifty questionnaires sheet were sorted village wise and pulled data information about aflatoxin awareness and assessment is done. Among the thirty four villages 81 questionnaires were collected from Muktainagar, 30 from Anthurli, 28 from Taroda , 15 from Naygaon and 10 from each Kothali, Hartala and Wadave and from other twenty seven small villages one to seven questionnaires were collected. Out of 250 individuals surveyed 14% were S.S.C., 36% were H.S.C., 33% and 06% were found graduate and post graduate respectively. The individuals who have obtained other qualification were found 11%. In the occupation status it has been observed that 08% were engaged in service, in business it was 09%, in agriculture it was 34% and the people involved in other business were found 49%. In consumption of oil it was found that 55% family utilized less than 5 Kg. or 5 Kg. of oil and 45% family consumed more than 5 Kg. of oil per month. 79% families are found which have 5 or less than 5 members and 21% families have more than 5 members in the family. The average consumption of oil per individual is found in between 1 to 1.5 Kg. per month. The soybean oil is consumed by 67%, groundnut 31%, cotton 01% and 03 % families used other type of oil. In adulteration of oil 63% individuals were aware and 37% were unaware about it. It is observed that 61% individuals purchased branded company oil, 17% utilized local brand oil whereas 22% found using loose oil. For the reason behind using branded oil, 63% individuals replied that it is always pure and good for health while 37% persons have replied for different reasons behind using branded oil. The reasons behind purchasing local company oil 20% have answered, for getting it cheaper and easily available compared to that of the branded one, and 80% have replied that there are other reasons besides these to purchase local company oil. The other common reasons were found are saving money, scarcity of money, economically reasonable, and poor purchasing capacity of the individuals. The information collected on the physical fitness of the people, indicates that 94% individuals were found physically sound and only 6% were suffering from different physical problems. The common physical problems recorded are allergic to dust, oil smell, diabetic, asthma, arthritis, cervical spondylysis and itching hand skin and none found related to carcinogenic. Data collected on different types of storing appliances for groundnut indicates that among 250 individuals surveyed 15% used plastic gunny bags, 19% used plastic container, 54% used aluminium tin to store groundnut pods and12% used to keep it open. 36% individuals were aware about the aflatoxin and 64% were found unaware about it. 48% consumers were aware about the toxin, other than aflatoxin and 52% were unaware about this. All these surveyed individuals made aware about the aflatoxin and the reasons behind producing it.

Key words: *Aspergillus flavus,* aflatoxins, groundnut, mycotoxins, survey

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INTRODUCTION

Mycotoxins (mykos = of fungal origin; toxikoses =toxins) are toxic substances produced mostly as secondary metabolites produced by fungi that grow on seeds and feed in the field, or in storage. The occurrence of mycotoxins in agricultural commodities is a major health concern for livestock and humans. Aflatoxins are the secondary metabolites of the fungi namely, *Aspergillus flavus* and *A. parasiticus.* Aflatoxins are further differentiated into sub types such as B1, B2, G1, G2 because of their blue (B) and green (G) fluorescence under ultraviolet light respectively, based on structure, chromatographic and fluorescent characteristics. These fungi can infect the crop in the field, or the produce during the processing, handling, storage. On the infected pods, kernels or in the culture, the fungus produced olive green coloured colonies with abundant sporulation, the accumulation of the aflatoxins occurs in the kernels or feed. Both raw and processed fruits and vegetables are highly susceptible to mycotoxin contamination (Giryn and Szteke 1995). *A. flavus* is often countered as a tomato fruit rot pathogen during post harvest survey (Samyal and Sumbali 2002). Aflatoxins are potent carcinogenic substance and have also been implicated in human diseases like hepatitis B, tuberculosis by suppressing immune system. Spores of *A. flavus* are saprophytic in nature and once they become pathogenic, they are known to produce an array of toxic secondary metabolites including aflatoxins (Nallathambi and Umamaheswari 2009). Aflatoxins are known to be highly carcinogenic and have been classified as group I carcinogens by International Agency for Research on Cancer (IARC 1993).Thus, aflatoxins have become of concern in agriculture as well as in animal and human health on a global scale.

Three basic approaches viz, prevention, removal and detoxification seem to be promising for aflatoxins control. Use of crop rotation and intercropping found useful in preventing aflatoxins contamination (Desai and Ghewande, 1999).Addition of calcium and gypsum also reduce pre-harvest aflatoxin contamination (Davidson et al, 1983).Use of resistance genotype like Chitra (Desai ,1990),PI-337409 (Pettit et al,1986) and other bold seeded genotype like ICG-239, B-95, B-99-1 supported to lowest aflatoxin production (Ghewande et al,1993) are useful in resistance breeding programme. Simple methods like exposure of oil to bright sunlight, use of common salt (10%) are useful even at household level for detoxification of aflatoxin (Shantha, 1977). The different factors responsible for aflatoxin contamination at different level are catagories as pre –harvest level i.e.at soil level -native population of *A. flavus* group of fungi varies from farm to farm depending on soil types and crop rotations. At plant level-drought prone sandy soil in which groundnut is grown year after year are hot spots for aflatoxin contamination. Prolonged drought 3-4 week during seed formation and maturation stages triggers aflatoxin contamination. Harvesting level-Mechanical damage to the pods at the time of harvesting, threshing or damaging testa during the process of decortications. Harvesting of crop immediately after irrigation and consequent high initial pod moisture at the time of processing and storage promote condition for aflatoxin build up in the produce. Inefficient and slow drying process under the humid condition enhances aflatoxin contamination risk greatly. Post harvest level (storage level) – storage of produce in warm and humid room with a large stack directly on the floor favours rapid multiplication of the fungus and affects even good lots.

MATERIALS AND METHODS

To conduct survey on aflatoxin awareness and assessment a questionnaire of fifteen different questions was prepared. The questions were related with their qualification, occupation, number of members in the family, whether they have previous knowledge of aflatoxin contamination in groundnut and other related toxins produced due to adulteration in consumable food items. Quantitiwise and qualitywise monthly utilization of edible oil by the family. Reasons behind the utilization of branded and local product of edible oil, physical fitness, use of different means like gunny bag , plastic container, aluminium tin or the open space for storing groundnut .

This survey was carried out during the year 2012-13 and data was collected personally from the individuals. The more focus was emphasized on collecting information mostly from the farmers and middle class consumers to create more awareness about aflatoxin and other food related toxin among the population. Here, in this survey study, data was collected from different villages of Muktainagar taluka in Jalgaon district (Maharashtra).The number of total different villages covered in this survey were thirty four details of which is given in the table. All these two hundred fifty questionnaires sorted village wise and pulled data information about aflatoxin awareness and assessment is done.

RESULTS AND DISCUSSION

The data in the Table 1 indicates village wise distribution of 250 questionnaires collected, total thirty four villages were covered to collect data. Among the thirty four villages 81 questionnaires were collected from Muktainagar, 30 from Anthurli, 28 from Taroda, 15 from Naygaon and 10 from each Kothali, Hartala and Wadave. Besides these seven villages, twenty seven small villages were covered and nearly one to seven questionnaires were collected from these villages.

Table 1.Number of questionnaires collected from different villages of Muktainagar taluka of Jalgaon district

Sr. No.	Village Name	No. of questionnaires	Sr. No.	Village Name	No. of questionnaires
1	Muktainagar Taluka	81	18	Bhelkhed	01
2	Nandwel	01	19	Anthurli	30
3	Jondhankheda	03	20	Chinchkheda	03
4	Changdeo	02	21	Salbardi	07
5	Karki	06	22	Hartala	10
6	Mehun	01	23	Taroda	28
7	Purnad	01	24	Ghodasgaon	01
8	Shemada	01	25	Narvel	02
9	Wadoda	01	26	Wadave	10
10	Charthana	06	27	Sukali	03
11	Satod	03	28	Fantodi	01
12	Rigaon	01	29	Naygaon	15
13	Patodi	01	30	Amadgaon	01
14	Pimpri bhojana	01	31	Pimpripancham	02
15	Kothali	10	32	Uchande	05
16	Ruikheda	06	33	Kura-Kakoda	02
17	Sarola	02	34	Borkheda	02

The data in the Table 2 illustrate about two parameter educational qualification and occupation of the individuals surveyed. The parameter educational qualification was added in the questionnaires to know about the civilized status of the people and it has been observed that among the 250 people answered 35 individual (i.e.14%) were S.S.C., 90 individual (36%) were H.S.C.,82 individual (33%) and 14 individual (06%) were found graduate and post graduate respectively. The individuals who have obtained other qualification were found 29 (i.e.11%).In the occupation status it has been observed that out of 250, 20 i. e. 08% were engaged in service, in business it was 22 (09%), in agriculture it was 86 i.e.34% and the people involved in other business were found 122 i.e.49%.

Table 2 .Parameter wise data collected from 250 questionnaires

Sr. No.	Educational Qualification	No. of Individual	Percentage over total	Sr. No.	Occupation	No. of Individual	percentage over total
1	S.S.C.	35	14	1	Service	20	08
2	H.S.C.	90	36	2	Business	22	09
3	Graduate	82	33	3	Agriculturist	86	34
4	Post Graduate	14	06	4	Other	122	49
5	Other	29	11	-	-	-	-

The result obtained for other parameters like family members, rate of oil consumption per month, type of oil, adulteration in oil, purchase of oil, reason behind using branded and local company oil, physical fitness, storing facility for groundnut, and awareness of the people about aflatoxin and other toxin in groundnut is shown in the Table 3.

To determine the rate of oil consumption per family per month, the rate of oil consumption was categories in two type i.e. in type one family using 5Kg.or less than 5 Kg. of oil was included and in type two family using more than 5 Kg. of oil was included. The results shows that among the 250 individuals 138 (i.e. 55%) family utilized less than 5 Kg. or 5 Kg. of oil per month and 112 (i.e.45%) family consumed more than 5 Kg. of oil per month. If we have compared the data on the rate of oil consumption per month with that of family members, this indicates 79% families are there which have 5 or less than 5 members in the family and 21% families have more than 5 members in the family.The monthly regular consumption of oil per individual is found in between 1 to 1.5 Kg. per month.

The data was collected on type of oil consumed by the consumer and it has been observed that soybean oil is consumed maximally by 168 i.e. 67%, groundnut 78 i.e.31%, least cotton 03 i.e.01% and 07 i.e.03% families used other type of oil for their regular consumption.

Table 3 .Parameter wise data collected from 250 questionnaires

1	Family Members	5 or less than 5	197 (79%)
		Greater than 5	53 (21%)
2	Rate of Oil Consumption per month	5 or less than 5 Kg.	138 (55%)
		Greater than 5 Kg.	112 (45%)
3	Type of Oil Consumed	Groundnut	78 (31%)
		Soybean	168 (67%)
		Cotton	03 (01%)
		Other	07 (03%)
4	Adulteration in Oil	Yes	158 (63%)
		No	92 (37%)
5	Purchase of Oil	Branded company	154 (61%)
		Local company	43 (17%)
		Loose	55 (22%)
6	Reason behind using branded company oil	Pure	159 (63%)
		Other	91 (37%)
7	Reason behind using local company oil	Cheaper/easily available	50 (20%)
		Other	200 (80%)
8	Physical Fitness	Yes	15 (06%)
		No	235 (94%)
9	Storing Facility	Plastic gunny bag	38 (15%)
		Plastic container	47 (19%)
		Aluminium tin	135 (54%)
		Open space	30 (12%)
10	Awareness about Aflatoxin	Yes	90 (36%)
		No	160 (64%)
11	Awareness about other toxin	Yes	121 (48%)
		No	129 (52%)

Now a days it has been observed that some agencies knowingly or unknowingly are doing adulteration in oil to fetch more money without taking health care of the consumer. So, to make consumer aware about this adulteration they were asked whether they are aware about this or not the answer was collected in yes or no form. Data in table 3 indicates that out of 250 individuals 158 i.e. 63% were aware and remaining 92 i.e.37% individual were unaware about this. They were made aware and insisted them to purchase good quality oil for better health. To know the purchasing level of the individual the data was collected in three categories i.e. branded, local and in loose type. It has been observed that 61% individuals purchased branded company oil, 17% utilized local brand oil whereas 22% found using loose oil.

Those who were using branded oil for culinary purpose an effort was made to find out the reason behind using branded oil, it was found that out of 250 individuals 159 i.e.63% individuals used it because it is pure and good for health while remaining 91 individuals (37%) have replied for different reasons behind using branded oil.

In the reasons behind purchasing local company oil 50 (i.e.20%) have answered for getting it cheaper and easily available compared to that of the branded one, the remaining 200 (i.e.80%) have replied that there are other reasons besides these to purchase local company oil. The common reasons for purchasing local company oil over the branded were saving money, scarcity of money, economically reasonable, and poor purchasing capacity of the consumers.

The information was collected about the physical fitness of the people, the main idea behind this was to know about what are the common physical problems among them, and could we find out any relation with their life style. It has been observed that out of 250 individual 235 (i.e. 94%) were found physically sound and only 15(i.e.6%) were suffering from different physical problems. The common physical problems recorded from the data are allergic to dust, oil smell, diabetic, asthma, arthritis, cervical spondylysis and itching hand skin, which were very common and none found related to carcinogenic or cancer in origin.

For storing groundnut while using for domestic purpose data was collected on different types of storing appliances or alternatives used by the local village people. It has been observed that among 250 people 38 (i.e.15%) used plastic gunny bags, 47 (19%) used plastic container, 135 (54%) used aluminium tin to store groundnut pods and remaining 30 people (i.e.12%) used to keep open temporarily before consumption.

To know the awareness among the people about aflatoxin which was the main concept of this survey from the data collected it is found that out of 250 individual only 90 i.e.36% were aware about the aflatoxin and 160 i.e.64% were unaware about aflatoxin. These unaware individuals were made aware about aflatoxin during collecting information from them.

Besides aflatoxin an effort was made to know about if consumer is aware about the toxin (other than aflatoxin) which may cause due to any other reason and the result for this is found that out of 250 individuals 121 (48%) replied yes for this and remaining 129(52%) were unaware about this.

So, to keep groundnut free from aflatoxin dry well, filled healthy pods and bring down pod moisture below 10%.Use always new and clean gunny bags or aluminium tin to store the groundnut. Produce must be stored in a well-ventilated leak proof room. Store bags on wooden pallet, keep one meter distance from walls and between stacks. Do not keep immature and damaged pods along with healthy pods. Do not dry diseased or pest infected pods along with healthy pods. During store the produce moisture should not exceed 10% .Try to avoid old and damaged bags for storing which may be infested with pests. Try to avoid keeping bags directly on the floor. Remove shriveled, discoloured and damaged kernels from the lot including the nuts with broken testa by hand picking and then put them in new gunny bags. By adopting and applying these tips, it has been possible to obtained aflatoxin risk free groundnut..

CONCLUSION

The occurrence of mycotoxins in agricultural commodities is a major health concern for livestock and humans. Aflatoxins are the secondary metabolites of the fungi namely, *Aspergillus flavus* and *A. parasiticus*. Aflatoxins are potent carcinogenic substance and have also been implicated in human diseases like hepatitis B, tuberculosis by suppressing immune system. Among all the parameter studied in the survey on aflatoxin awareness and assessment, from the data analyzed, it is concluded that the parameters like educational qualifications, occupation, family members, physical fitness are of least importance but the parameters which are related with direct consumption of oil for culinary purpose are of more importance. It is to be taken very seriously and there is an urgent need to aware the society people regarding adulteration in oil, insist them to purchase good quality or branded company oil. It is necessary to consume oil in appropriate quantity, to much or over use i.e. beyond limit may cause health problems in future. All types of food materials stored for consumption must be well dried and stored properly.

Here in this aflatoxin survey it has been observed that only 36% individuals are aware about aflatoxin contamination in groundnut, so there is need to make remaining 64% individuals aware about aflatoxin and problems caused due to consumption of aflatoxin contaminated groundnut or oil. So to make all individuals 100% aware about aflatoxin contamination in the food items, there is needed to conduct campaign for this through college level by students of life sciences, Food Corporation of India, Food and Drugs Research Institute, Health and Agricultural departments. There is need to keep check on this by sudden sample collecting , from market yards, provisions store and agricultural produce and detecting the level of aflatoxin contamination through ELISA and TLC method.

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