

Comparative Analysis Of Nutritional Value And Aflatoxin Level Of Maize Grain From Different Sites Of Rajasthan

Uday Kumar, Bhawana Kweera

Abstract: In the present work nutritional value and aflatoxin contamination in Maize grain from different site of Rajasthan were investigated. The samples of Maize grain were collected from different sites of Rajasthan and stored in jute bags. These samples were evaluated for its nutritional value and aflatoxin contamination using standard methods. The results of investigation show that there is variation in nutritional value and aflatoxin level of maize samples from different sites of Rajasthan. Maize from Ramganj shows the high nutritional value in compare to other four samples. The samples from Bundi and Ramganj show absence of aflatoxins. Maximum level of aflatoxin is found in Alwar maize. Hence from the above analysis it is concluded that percentage of aflatoxin depends on moisture content, higher the moisture content more is aflatoxin contamination. This study reveals that the chance of aflatoxin contamination is minimum when the level of moisture content is 8.96 – 9.32%.

Key words: Maize, Aflatoxin, Nutritional value

Introduction:

Maize (*Zea mays*) is the third most important crop after rice and wheat cultivated in the world. Cereals such as wheat and bajra are members of the grass. Another estimate indicates that maize grain accounts for about 15 to 56 percent of the total daily calories in diets of people in about 25 developing countries (Prasanna, 2001). Besides this, it is also used as industrial starch and in pharmaceuticals as dextrose, ethanol and corn oil (Pomeranz *et al.*, 1981). In India Rajasthan is the second largest producer of maize after Bihar. Different place of Rajasthan where Maize is cultivated are Bundi, Alwar, Ramganj, Bhilwara and Kota. The word aflatoxin comes from a = *Aspergillus*, fla = *flavus* and toxin = venom. Aflatoxin is fungal secondary metabolites that form a group of toxic compounds that chemically correspond to furan coumarins (Hell 1997). The four major group of aflatoxins are identified: B₁, B₂, G₁, and G₂. It causes cancer and damage liver in human beings, decreases milk production in animals and effects fertility in birds. However, corn kernels are subject to infection by a variety of toxigenic fungi. (Francis and Burgess, 1975; Marasas *et al.*, 1981; Zummo and Scott, 1992; Widstrom, 1996; Abdullah *et al.*, 1998; Cardwell *et al.*, 2000), Nutritive value includes determination of carbohydrate proteins, fats, fibers, calories and elements (Anon 1990). The nutrient composition varies in the same species of crop with different environmental conditions. Since Rajasthan is second major productive state of Maize but there is not much more information about the nutritional value and aflatoxin level of crop in this state. To create awareness among the people with these parameters the above studied were carried out, so that it can be known that which part of Rajasthan produces high nutritional value and low aflatoxin maize crop.

Materials and Methods:

Maize is collected from different site of Rajasthan and stored in jute bags. Further the samples were evaluated for its nutritional value and aflatoxin level. The nutritional analysis involves the following parameters: Moisture-content, Crude-protein, Crude-fibre, Crude fat, Total-ash, Calorific-value, Mineral-analysis, Aflatoxin analysis.

Result and Discussion:

S.No	Parameters	Different Sites of Rajasthan				
		Bundi	Alwar	Ramganj	Bhilwara	Kota
1	Moisture %	8.96	12.45	9.32	10.77	10.42
2	Crude protein %	8.75	8.72	9.29	8.85	8.96
3	Crude fibre %	2.40	2.21	2.21	2.08	2.10
4	Crude fat %	3.98	3.92	4.19	4.00	4.06
5	Total ash %	1.23	1.14	1.18	1.20	1.27
6	Calcium (mg)	49.9	0.65	57.98	47.98	43.99
7	Phosphorus (mg)	280	247	267	245	276
8	Calorific value (cal/g)	3999	4017	4291	3982	4003
9	Aflatoxin (ppb)	nil	39.9	nil	0.5	1.3

Moisture: Moisture percentage is estimated by oven drying method. Major moisture content is present percentage is estimated by oven drying method. Major moisture content is present in Alwar maize 12.45% followed by Bhilwara, Kota, Ramganj 10.77,10.4, 9.32%respectively whereas Bundi maize possess lowest moisture content i.e 8.96%.

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Crude Protein: Crude protein is estimated by Micro Kjeldahl method. Ramganj maize show high protein content i.e 9.29% Bhilwara, Kota, Ramganj and Alwar maize show protein content within the range of 8.72- 8.96%.

Crude fat: Crude fat is estimated by Soxhlet extraction apparatus. Ramganj maize contain high fat content (4.19%), Bhilwara and Kota have almost same fat content(4.04% & 4.06%) whereas both Bundi and Alwar maize contain low fat content of all 3.92%, 3.98% respectively.

Total ash: Total ash is determined by burning of sample in muffle furnace at 650°C. Kota maize possess high ash content (1.27%) and Alwar maize possess low ash content(1.14%).

Phosphorous analysis: Phosphorous is analyzed by phospho molybdenum method. Bundi maize contain high amount of Phosphorous i.e 280 mg followed by Kota (276 mg), Ramganj (267 mg), Alwar (247 mg) and Bhilwara (245 mg).

Calcium analysis: Calcium is determined by volumetric titration. Highest percentage of calcium is present in Alwar maize i.e 65 mg. In Ramganj, Bundi, Bhilwara and kota it is 57.98, 49.9, 47.98 & 43.98 mg respectively.

Calorific value: Calorific value of maize is estimated by Bomb Calorimeter. Ramganj maize possess high calorific value i.e 4291cal/g followed by Alwar,Kota,Bundi and Bhilwara maize i.e.4017,4003,3999,3982cal/gm.

Aflatoxin: Toxin was analyzed by Neogen Toxin Analyzer. Alwar maize contain 39.9 ppb which is high in comparison to the standard value given by FDA (20ppb).On the other hand Bundi , Ramganj maize are free from aflatoxin contamination.

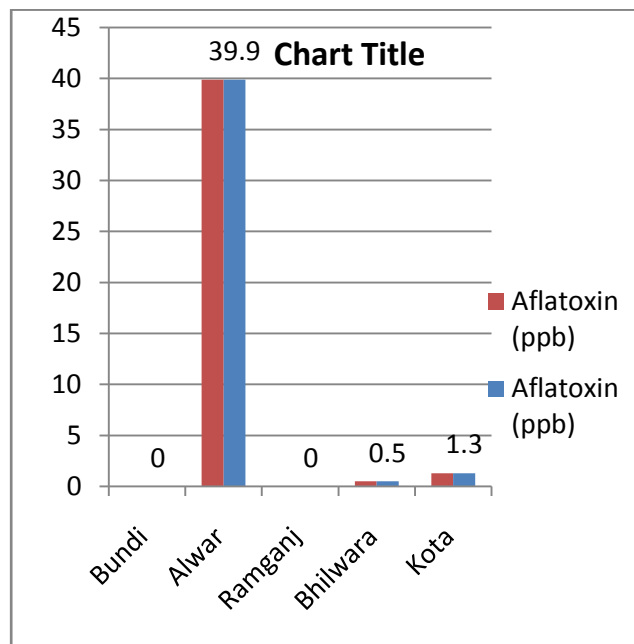


Fig -2 (aflatoxin in ppb)

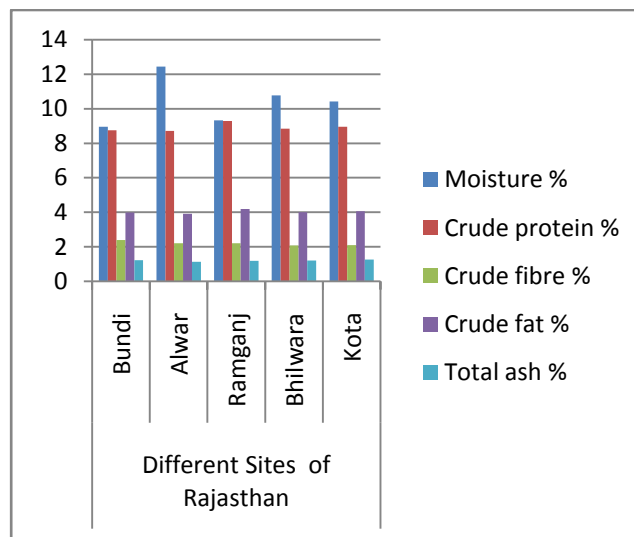


Fig -3 (nutritional value)

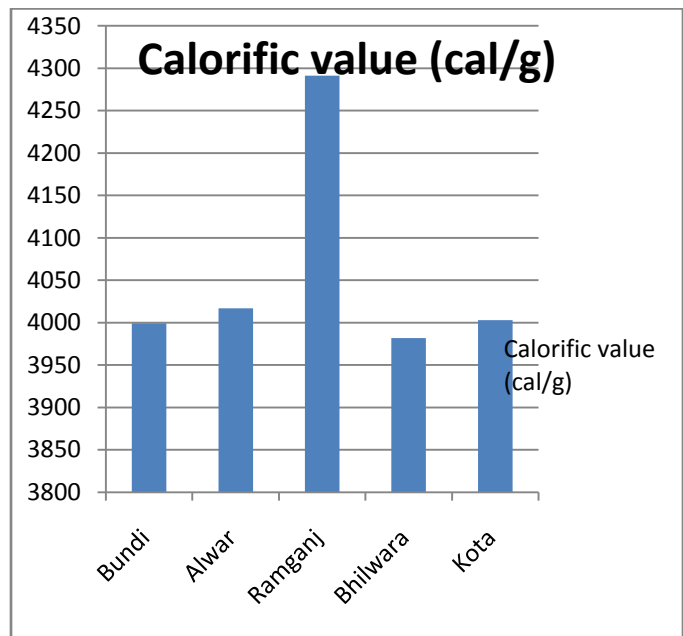


Fig -1 (energy in cal/gm)

Conclusion:

There is variation in nutritional value and aflatoxin level of maize samples from different sites of Rajasthan .Maize from Ramganj shows the high nutritional value in compare to other four samples.The samples from Bundi and Ramganj show absence of aflatoxins. Maximum level of aflatoxin is found in Alwar maize. Hence from the above analysis it is concluded that percentage of aflatoxin depends on moisture content, higher the moisture content more is aflatoxin contamination. The study reveals that the chances of aflatoxin contamination are minimum when the level of moisture content is 8.96 – 9.32%. Alwar maize contain 39.9 ppb which is high in comparison to the standard value given by FDA (20ppb) (United States Food and Drug Administration, 2000).On the other hand Bundi , Ramganj maize are free from aflatoxin contamination.

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