

AFLATOXINS IN SUNFLOWERS

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INTRODUCTION

In 1978, North Dakota was the leading producer of oil type sunflower seeds and accounted for 67 percent of the nation's production (1). As part of a seed quality study at North Dakota State University, 11 samples from bins in North Dakota were sent to a reference laboratory for oil analysis. Besides the oil analysis, the reference laboratory performed a Holaday-Velasco mini column analysis for aflatoxins. Nine of the samples were found to be positive (10-225 ppb)* for aflatoxin and seven exceeded the 20 ppb B₁ FDA action level.

Based on these findings, a survey was initiated to define the extent of aflatoxin contamination in North Dakota sunflower seeds. The original 11 samples were also subjected to further analysis.

PROCEDURE

The sampling and preparation were based on published protocols (2). Samples were collected from 24 cooperators. Seed moisture levels were used as initial criteria and an attempt was made to locate seeds with known storage problems. Therefore the survey may be biased towards seeds of questionable quality. The survey included 89 samples (three layers from each bin where possible) from 32 storages in 11 counties in the eastern half of North Dakota. These 11 counties account for approximately one-half of North Dakota's sunflower production (1). In addition, three research samples (grab samples) from a storage which showed gross mold growth and caking were collected.

The seed moisture determination was a modification of the ASAE Standard: S352 (3). Approximately 100 gm of seeds was dried at 130°C for 3 hrs. The seeds were assayed for aflatoxin by three methods (8).

RESULTS AND DISCUSSION

The moisture content of the survey samples varied from 4.2 to 14.8 percent. The overall average (n = 89) was 8.9 ± 2.1 percent moisture. Approximately 26 per-

cent of the survey samples exceeded the recommended 8-10 percent moisture content (4). Previous research indicates storage fungi problems when the moisture was as low as 9.5 percent (5).

Only one of the 89 survey samples was positive (Table 1) for aflatoxin. The aflatoxin level (8 ppb B₁) was below the FDA action level of 20 ppb aflatoxin. Within the scope of this survey, the low incidence of aflatoxin indicates that the possibility of aflatoxin contamination in the sunflower seed food chain is remote. This low incidence of aflatoxin in sunflower seeds has been previously reported (6). Only one of the original nine samples, which were called aflatoxin positive by the reference laboratory, was found to contain aflatoxin (Sample #1-Table 2). The presence of this aflatoxin-like material in sunflower seeds has been reported (76). The presence of this interfering material supports the crucial need for confirmatory assays.

Table 1. Sunflower Seed Survey Data

County	Storages	Samples	Sample* Moisture (%)	Positive Aflatoxins
Barnes	2	6	6.2 ± 0.6	0
Bottineau	3	3	8.5 ± 1.0	0
Cass	7	21	8.9 ± 2.4	0
Emmons	3	9	8.0 ± 3.1	0
Foster	1	3	8.9 ± 0.9	0
Logan	1	3	10.6 ± 0.6	0
McIntosh	1	3	10.0 ± 1.8	0
Richland	3	9	7.8 ± 1.3	0
Steele	2	6	11.0 ± 2.4	0
Stutsman	2	6	9.9 ± 2.1	0
Wells	7	20	8.6 ± 1.4	0**

* = means $\pm$ S.D.; ** = 8 ppb Aflatoxin B₁

The aflatoxin level in sample #1 (Table 2) varied from 200-1100 ppb B₁. We feel that this variation was due to the small amount of sample which was available for analysis. Research samples #2, 3 and 4 (Table 2) were also shown to contain 100 to 500 ppb aflatoxin B₁. In all cases where aflatoxin values are listed the authenticity of the aflatoxin was confirmed by the three methods previously listed. The potential for aflatoxin growth on sunflower seeds, in a laboratory setting, has been previously demonstrated (4, 6). It is believed that this is the first documented case of natural aflatoxin contamination in oil type sunflower seeds. However, the gross, visible quality of these contaminated seeds was such that they would not have been accepted by a reputable seed buyer. Problems could arise from the on farm use (i.e., dairy herds) of moldy sunflower seeds. The results of this survey indicate that North Dakota sunflower seeds which reach the commercial pipeline are free of aflatoxin contamination. However, it was verified that aflatoxin producing organisms can be sup-

*ppb = parts per billion

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continued on page 12