



Toxicity to Poultry of Common Weed Seeds¹

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Introduction

All plants are in some way useful and beneficial, so what makes a plant a “weed?” Modern agriculture involves the large-scale production of a single type of plant. Under these conditions any other type of plant is called a “weed” and is defined as “a plant out of place.” Seeds from these “out of place” plants often get harvested along with grain crops, and can find their way into poultry feeds. Unfortunately, some of these weed seeds are toxic to poultry.

Questions about weed seeds arise sporadically as contaminated grain samples are discovered. This review will not cover every weed seed found to cause adverse symptoms in poultry but rather will focus on the seeds most prevalent in grains grown or used in the Southeastern United States.

Crotalaria

Crotalaria is probably one of the most researched of the weed seeds affecting poultry. As early as 1884 crotalaria was labeled a poisonous plant in Iowa. Before extensive development of the livestock industry in southeastern United States, federal and state agricultural agencies recommended several of the over 600 crotalaria species as soil builders for

their nitrogen-fixing, green manure, and root-knot nematode-reducing attributes. They are also very useful for erosion control, and a fairly strong fiber can be extracted from the plant. In India, the plants are used to treat scabies and impetigo (contagious skin disease caused by streptococci or staphylococci) in humans.

Six or seven species of crotalaria have been identified as toxic to animals. The two most prevalent species found in the southeastern United States are *Crotalaria giant striata*, and *Crotalaria spectabilis*, with the latter being most harmful to poultry.

C. spectabilis (Figure 1) is also referred to as “showy crotalaria” or “rattlebox.” It is a robust annual plant 35 – 70 inches or more tall with an erect, somewhat ribbed stem bearing several stout, ascending branches. The alternating leaves are 4 to 7 inches long and dark green. The flowers are yellow, pea-shaped and borne on upright spikes on the top of the plant. The seed pods are smooth and nearly 2 inches long. They are light green when young, becoming nearly black when ripe.

The whole plant is smooth to the touch and waxy so that water stands in drops on the leaves. *C. spectabilis* seeds (Figure 2) are kidney-shaped, black,

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Figure 1. *Crotalaria Spectabilis* Plant

and glossy. The alkaloid "monocrotaline" is the principle toxin found throughout the plant and in greatest concentration in the seed.



Figure 2. *Crotalaria Spectabilis* Seeds

Consumption of *C. spectabilis* by laying hens has been reported to cause a rapid decrease of egg production and increased mortality. During post-mortem examination the birds were found to have ruptured livers with internal hemorrhage, and a fluid collection in the body cavity. Growing birds exhibited droopiness, huddling, mortality, marked abdominal fluid accumulation, and surface

hemorrhages on the liver followed by tissue deterioration.

Feeding trials using day-old chicks and ground *C. spectabilis* demonstrated that the adverse-effect level lay between 0.01 and 0.1% of the diet. Concentrations in excess of 0.3% were fatal within 18 days. Levels of *C. spectabilis* above 0.05% severely reduced egg production over 6 weeks. Hens on those levels were very emaciated due to feed rejection, and birds on 0.2% ate very little feed after the first week. Turkey studies have demonstrated that *C. spectabilis* was toxic to the liver when given to 4-wk-old birds in quantities greater than 0.125% of the diet. Cirrhosis developed when 0.25% or more was fed. *C. spectabilis* studies with Bobwhite quail have indicated that the seeds were poisonous but that under ordinary conditions they would not be eaten by birds when there was a choice of feedstuffs. Some individuals would even starve rather than eat the toxic material. *Crotalaria giant striata* has been found to be injurious to poultry at dietary concentrations greater than 0.1%. However, diets containing *C. spectabilis* were definitely more toxic than those carrying similar levels of *C. giant striata*.

No successful treatment for crotalaria poisoning has been reported.

Cassia Obtusifolia

Cassia obtusifolia (Figure 3) is the most prevalent species of *Cassia* contaminating corn and soybean harvests in the southeastern United States. This plant, commonly called sicklepod, coffeepod or coffeeweed, can reach heights of 70 to 83 inches.

It has teardrop-shaped leaves growing in clusters of four or six leaflets and produces sickle-shaped seed pods. The seeds (Figure 4) are brown and often parallelogram-shaped.

It has been reported that animal feeds are often contaminated with as much as 50% *Cassia* seed. It is thought that anthraquinones are the toxic compounds of this plant.

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Figure 3. Cassia Obtusifolia Plant



Figure 4. Cassia Obtusifolia Seeds

Laying hen experiments have shown that hens reacted more quickly when fed ground seed rather than whole seed. Ground *C. obtusifolia* levels as low as 1.5% depressed egg production.

In both chick and hen experiments, reduced feed intake has been implicated as the main cause of adverse effects by *C. obtusifolia*. Three percent *C. obtusifolia* has been shown to depress feed intake of broilers. Within 24 hours after starting hens on 7% seed, feed intake was decreased 37% below that of controls, indicating that taste plays a role in the adverse effects of weed seeds.

Cassia Occidentalis

Cassia occidentalis (Figure 5), also known as coffee senna, resembles in many details the *C. obtusifolia* plant (Figure 3) with the exception of having more numerous, pointed leaflets and flattened seed pods and seeds (Figure 6). Several toxic compounds (toxic albumin, chrysarobin, and toxalbumin) have been isolated from the seeds. Several anthraquinone derivatives have also been recovered.



Figure 5. Cassia Occidentalis Plant



Figure 6. Cassia Occidentalis Seeds

The signs of intoxication in the chicken have been described as weight loss, weakness, diarrhea, hypothermia, occasionally ataxia, recumbency, and death. Gross lesions included paleness of skeletal and cardiac muscles and congestion of the liver. Two percent *C. occidentalis* has been shown to reduce body weights and feed intake and .4% increases mortality. (Mortality was increased by 4% seed).

Sesbania

Sesbania macrocarpa (Figure 7) is a tall, annual leguminous shrub native to Mexico.



Figure 7. *Sesbania Macrocarpa* Plant

It now appears throughout the southern United States. It has cylindrical, curved seed pods and yellow flowers. The seeds are dark brown and resemble small capsules (Figure 8). Saponin, a type of bitter-tasting glycoside, has been reported as the main toxic component.



Figure 8. *Sesbania Macrocarpa* Seeds

Signs of poisoning are weakness, depression, anorexia, diarrhea, ruffled feathers, cold feet, and rapid body weight loss. In broilers, 1% ground *S. macrocarpa* will reduce growth. Three percent or more will depress the feed intake of hens, and 6% will reduce egg production. Instead of being considered toxic, *S. macrocarpa* has been recommended as a feed for Bobwhite quail. It has been determined that quail eat these seeds seasonally to offset shortages of other preferred foods. Quail may have a less acute sense of taste than chickens, or the less domesticated quail could have a greater tolerance for toxic seed elements than do chickens.

Jimsonweed

Jimsonweed (*Datura stramonium*) is a summer annual plant, 24 to 59 inches tall, with large white flowers and large egg-shaped leaves (Figure 9).



Figure 9. Jimsonweed (*Datura Stramonium*) Plant

The seeds are usually dark brown in color and light in weight with a rough outer seed coat (Figure 10).

Reported grain contamination rates have ranged from 0.5 up to 4,800 seeds/lb in samples of corn screenings. The signs of toxicity are consistent with those associated with the seed's alkaloid content. Those signs include abnormal contraction of the pupil



Figure 10. Jimsonweed (*Datura Stramonium*) Seeds

of the eye (miosis), excitability, muscle tremors, nervousness, and sudden death.

Up to 3% ground jimsonweed seed did not reduce performance of broilers or layers during short-term exposure (21 and 14 days, respectively). However, a significant reduction of feed consumption by hens receiving 3% jimsonweed seed indicated that longer-term ingestion might cause reduced performance.

Summary

The purpose of this publication is to bring together pertinent information concerning the identification and toxicity of weed seeds commonly encountered as grain contaminants in the southeastern United States. The physical characteristics of the plants and seed are described and photographs are included to aid the identification process. The toxic compound or group of compounds is given when known, along with the common and scientific names. Physical and performance-related symptoms are discussed.