Creeping Indigo Toxicity in the Horse

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Overview

- Creeping Indigo toxicity
  - The plant
  - The signs
  - Solutions?

Creeping Indigo

- Pink to red flowered shrubs and herbs
- Two closely related species in FL
- *I. hendecaphylla*
- *I. spicata*
- Both prostrate to suberect with branched runners

Creeping (Trailing) Indigo *Indigofera spicata*

- Brazil native
- "Grove Poisoning"
- Palatable legume
- Trailing growth
- Clover-like leaves
- Pink flowers
- Pod cluster
- Spreading north

Creeping Indigo

- Perennial in tropical and subtropical climates
- Stiff sharp-tipped seed pods, 1-3 cm long, in dense downward pointing clusters

3-Nitropropionic Acid (3-NP)

- Toxin released from the creeping indigo plant that interferes with mitochondrial energy production – Nerve cells are very vulnerable to energy deprivation!
- Produces lesions within the basal ganglia of the brain that includes the striatum (caudate, and putamen) and globus pallidus leading to neuronal degeneration and motor dysfunction
- Related to such poisons as cyanide, carbon monoxide, MPTP, rotenone (insecticide), and manganese
- Metabolized quickly and not found in blood

Indospicine

- Toxin responsible for corneal edema, ulcerations, and non-neurologic signs
- Non-protein amino acid that is toxic to liver because it antagonizes arginine
- Inhibits nitric oxide synthase – corneal edema and ulcerations
- Can be detected in serum or tissues

Creeping Indigo Signs

- Consumption of 10 pounds of I. linneae for 3 weeks is sufficient to cause the similar Birdsville disease (Queensland AUS)
- Signs of toxicity are neurologic and non-neurologic
- Horses that are quickly removed may recover completely

Outbreak 1

- Brooksville
- Fall 2004
- Miniature donkeys
- 5/9 affected
- Depression, incoordination, weakness
- 1 aborted, 2/5 died

5-yo Sicilian donkey mare

Near Tampa, Fall 2006/2007

- 5 acre pasture
- 4 horses on pasture Fall 2006
  - 1 TB, 1 pony, 1 AMH died after courses of 1-2 weeks ocular discharge, staggering gaits, recumbency
- 4 horses on same pasture Fall 2007
  - 2 ponies photophobic, ocular discharge
  - 1 became weak, incoordinated, presented to UF

11-yo pony gelding

Fall 2007

- Homestead, Florida
- 5 Paso Finos on 3-acre paddock
- 4 staggering, weak
- Removed from pasture, 3 improving
- Suckling foal recumbent, seizure-like activity
- Referred to UF

3-mo Paso Fino filly

Summary

- All in Fall
- All at pasture
- “Opaque”, white mucous membranes
- Oral, tongue ulcerations
- Photophobia, corneal edema/ulcerations
- Variety of neurologic presentations

- ~50% fatal
- No gross, histologic CNS lesions!!!!!

Signs

Clinical Signs

- Weight loss
- Inappetance
- Increased HR and RR
- Hypersalivation
- Watery discharge from eyes
- Light sensitivity
- Cornel opacity and ulceration
- Quiet/less energetic
- Depression to loss of conciousness
- Low head carriage
- Head pressing
- Nystagmus
- Abnormal gait
- Incoordination and weakness
- Seizures

Diagnosis

- Diagnosis
  - Pasture access with presence of the plant
  - Numerous animals on property affected
  - Opaque mucous membranes, other changes with presence of varying neurological deficits
  - Indospicine assay? Season?

Treatment options

- Supportive: maintain adequate nutritional intake (tube with mash, juice, beer and molasses?)
- Antioxidants: Vitamins C and E
- NMDA antagonist: Magnesium sulfate, ketamine
- Nitric oxide synthase: Arginine supplementation – proposed use of arginine rich protein sources such as peanut meal and gelatin
- Remove from source

So now what?

- 50% or more (?) will recover
- May retain neurological deficits upon recovery, some will recover completely
- Prevention
  - Weed identification and control
  - High quality feed and hay to prevent animals from searching for the weed

Thank you!! Any Questions?