Creeping Indigo Toxicity in the Horse



Amanda M. House, DVM, DACVIM Rob MacKay, BVSc, PhD, DACVIM

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 nonneurologic
- 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!!!!!





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?

