Larkspur (Delphinium species)
Identifying larkspurs - note spur on the flowers
Delphinium (Larkspurs)

- Diverse group
- Divided into three categories:
  - tall (*barbeyi, occidentale*)
  - low (*nuttallianum, andersonii, bicolor*)
  - plains (*geyeri*)
- Cause $6-10$ million in losses annually
Various Larkspur Types

- Tall larkspurs - grow 3-6 ft. tall
- Low larkspurs - few fine stems and grow 8-24 in. tall
- Plains larkspur - intermediate type that reaches 24-36 in. tall
Tall larkspurs

- Tall larkspurs: found in mountain habitat in the western U.S. - generally moist sites - 6,000 to 10,000 feet elevation
- Tall larkspur sites typically snow-covered during winter
- Tall larkspurs grow in forb-dominated sites; very nutritious forage and high carrying capacity
Tall larkspur distribution

D. barbeyi  D. glaucescens
D. glaucum  D. occidentale
Low Larkspurs

- Grow early in spring on foothill and mountain ranges with adequate spring moisture - 3,000 to 9,000 ft. elevation
- Depending on moisture and temps, may persist for 6 weeks or so
- Density influenced by spring moisture; lower density usually means fewer losses
Nuttallianum = nelson larkspur
Delphinium andersonii
Distribution of plains larkspur

Delphinium geyeri
Larkspurs are among the first plants to emerge in spring.
How does tall larkspur grow?

● Old growth dies back in fall
● During winter new buds from root crown can grow under snow
● New stems may penetrate over 6 inches of snow to reach sunlight
How does tall larkspur grow?

- New emergent stems are among first plants to come up from under melting spring snow.
How does tall larkspur grow?

- Tall larkspurs emerge in sometimes dense patches from receding snow banks.
Dominant toxic alkaloid in larkspurs

- There are numerous diterpenoid alkaloids in larkspurs (> 20)
- Ester function at C18 is very important for toxicity
- **Deltaline** most common alkaloid in tall larkspurs but not very toxic
- **Methyllycaconitine** = MLA

Methyllycaconitine
Dominant toxic alkaloid in larkspurs

MLA is most common toxic alkaloid
- found in tall and low larkspurs
- LD 50 is about 4.5 mg/kg in mice (I.V. injection)
Seasonal Change in Toxicity

Toxic Alkaloid Concentration (mg/g)

- Leaves
- Reproductive

- < 3 mg/g - low
- 3-6 mg/g - moderate
- > 6 mg/g - high
Key aspects of ingestion and toxicity

- First, amount of larkspur eaten
- Second, rate of ingestion
- Third, toxicity of larkspur
- Fourth, how many consecutive days larkspur is eaten in substantial quantities
Percent of diet as tall larkspur

Toxic alkaloid concentration (mg/g)

0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0

High Dose

Moderate Dose

Low Dose

Percent of diet as tall larkspur
When and how much larkspur do cows eat?

- Cattle eat little or no larkspur before larkspur elongates flowering racemes.
- After flowering, if cattle eat larkspur, then consumption usually increases greatly during late flower and pod stages.
- Traditional grazing mgt: put cows into larkspur (poison) pastures after larkspur flowers.
Relative Palatability

Relative Toxicity

High

Low

Grazing Window

Phenological Stage

Late season grazing with low risk