

EFFECTS OF TIMING OF DEFOLIATION ON SPOTTED KNAPWEED SEED PRODUCTION AND VIABILITY



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Spotted knapweed (*Centaurea stoebe* L.) is an invasive perennial forb which is one of the most economically destructive exotic species in the northwestern United States and southwestern Canada. Spotted knapweed forms large monocultures, which lowers plant diversity, reduces livestock and wildlife forage, and increases surface water runoff and soil erosion. It can produce 25-35 flowers/head, 60 heads/plant, and 5,000-40,000 seeds/meter²/year, and often produces new flowers after bud/flower removal during the bolting or flowering stage. Prescribed livestock grazing is an effective control method that is less expensive and more ecologically friendly than herbicides, however, research has yet to determine if new flowers produced following spring/summer bud removal produce viable seed by the end of the growing season. The purpose of this 2-year study was to determine the appropriate timing(s) or combination(s) of timings of defoliation on spotted knapweed to reduce viable seed production.

Treatments:

- Treatment 1: Clip plants to 9-cm stubble height (45% utilization) during bolting stage (mid-June)
- Treatment 2: Remove 100% of buds/flowers + 3 cm of foliage beneath buds during late-bud/early-flower stage (mid-July)
- Treatment 3: Remove 100% of flowers + 3 cm of foliage beneath buds during full flower stage (mid-August)
- Treatment 4: Treatment 1 + Treatment 2 (June + July)
- Treatment 5: Treatment 1 + Treatment 3 (June + August)
- Treatment 6: Treatment 2 + Treatment 3 (July + August)
- Treatment 7: Treatment 1 + Treatment 2 + Treatment 3 (June + July + August)
- Treatment 8: Unclipped Control

2006 Results (Table 1):

- Clipping in June, July, or June+July reduced the number of buds by 72% compared with no clipping.
- Clipping in August, June+July, June+August, July+August, or June+July+August reduced the number of buds by 92% compared with no clipping.
- Clipping in June reduced the total number of seeds by 75% compared with no clipping.
- Clipping at all other times or combinations of timings reduced the total number of seeds by 98% compared with no clipping.
- Clipping at any time or combination of timings reduced the total number of viable seeds by 98% compared with no clipping.

Table 1. 2006 Results

Treatment	# Buds/Flowers Per Plant	# (% of total) Seeds Per Plant by Stage of Development			Total # Seeds Per Plant	Total # Viable Seeds Per Plant
		Doughy	Intermediate	Mature		
June	8	61 (67%)	7 (8%)	23 (25%)	91	22
July	8	14 (78%)	3 (17%)	1 (5%)	18	0
August	3	0 (0%)	0 (0%)	0 (0%)	0	0
June+July	4	16 (94%)	1 (6%)	0 (0%)	17	0
June+Aug	0	0 (0%)	0 (0%)	0 (0%)	0	0
July+Aug	2	0 (0%)	0 (0%)	0 (0%)	0	0
June+July+Aug	0	0 (0%)	0 (0%)	0 (0%)	0	0
Control	24	130 (40%)	18 (6%)	177 (54%)	325	179

Summary: Preliminary results suggest that because spotted knapweed is a short-lived perennial that reproduces solely by seed, prescribed livestock grazing in summer should effectively suppress this weed, especially when seedheads are removed by grazing in July or August.