



## Yellow Rattle

### A Grass-Attacking Weed in New Hampshire Hay Fields

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Yellow Rattle. Photo: Alan Eaton.

Yellow Rattle, *Rhinanthus cristagalli* L., is an annual plant in the family Orobanchaceae with green leaves, yellow flowers, and flat roundish seed pods. When mature and dry, the seeds rattle slightly when the pods are shaken. A heavy infestation can kill grasses in one year.

In June of 2012 and 2013, Alan Eaton, Ross MacKeil, Elizabeth Puris, Daimon Meeh, Steven Turaj and Carl Majewski made a preliminary survey of New Hampshire hay fields for a parasitic plant called **yellow rattle**. Botanists refer to it as a hemi-parasitic plant, because it has green leaves and produces some of its food via photosynthesis. But the roots attack nearby roots, and are especially rough on grasses. *Rhinanthus cristagalli* L. is an annual plant in the family Orobanchaceae with green leaves, yellow flowers, and flat, roundish seed pods. When mature and dry, the seeds rattle slightly when the pods are shaken. A heavy infestation can kill grasses in one year. It is native to Europe.

Steve Turaj was the first to call it to our attention in New Hampshire, but it has been here a long time. If it were in weed manuals, it would be called a spring annual weed.

We wanted to determine the relative abundance and severity of this plant in NH hay fields. (There isn't much problem in lawns & pastures.) We wanted to see if identification was relatively easy (no other species with which it would be confused). We hoped to find some common patterns of abundance/distribution, even though it was a limited survey. To survey, we had to wait until the plants were clearly visible and identifiable (12 – 16” tall, with flowers), yet do our counting before the field was mowed. That left a narrow time window for the work --- basically, June. We visited 173 fields, reaching every county in the state. At each field we threw a 15” sample ring at ten spots, and recorded the number of yellow rattle stems growing inside the ring. We also thoroughly walked the field, searching for YR and visually assessed the infestation on a scale of 1 to 5, with 1 being “none seen” and 5 being “severe”.

In 37% of the fields we checked, we found this plant. We gave a “severe” rating to only 8 of the 173 fields, and “moderately high” rating to only 7 fields. We did not find any plants that were easy to confuse with YR. The combination of flat seed pods, yellow non-symmetrical flowers, and narrow, toothed, opposite leaves is unique. We found the plant state-wide, in appropriate habitat (like hay fields).

County	# of Fields	# of fields Yellow Rattle	% of fields with Yellow Rattle	Average Severity
Belknap	12	3	25%	1.33
Carroll	14	7	50%	1.71
Cheshire	14	1	7%	1.07
Coos	7	5	71%	2.57
Grafton	11	10	91%	3.36
Hillsborough	30	3	10%	1.20
Merrimack	15	0	0%	1.00
Rockingham	23	17	74%	2.43
Strafford	37	16	44%	1.73
Sullivan	10	2	20%	1.20
<b>Overall</b>	<b>173</b>	<b>64</b>	<b>37%</b>	<b>1.69</b>

Severity rating	No. of fields	Avg. No. YR stems per ring throw
1 (none)	109 (63% of total)	0
2 (low)	31 (18%)	0.35
3 (moderate)	18 (10%)	3.67
4 (mod. high)	7 (4%)	6.34
5 (severe)	8 (5%)	15.71

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The only factor that seems common to all fields that had moderate to high populations is: **late cutting**. Relatively early cutting is the easiest, most effective way to control this species. We usually don't see YR in grass haylage fields, except along the edges. Larger harvesting equipment makes for missed field edges and a wider turning radius. Mowing height is also a factor. Mow too high, and you miss YR seed heads (Steve Turaj has seen flowers at 4 inch height), but too low, as with most rotary mowers, scalps field and delays grass regrowth. Scalping is something that may contribute to bedstraw infestations as well, since it allows weeds to get a toe-hold.

Two heavily infested fields in Strafford county showed significant drop in YR population after a heavy application of wood ash (3 tons/acre). In these fields, clovers quickly filled in, but within 2 years, timothy and orchard grass had substantially returned. We do not know why wood ash helps. Many fields have low soil pH, so it may work by raising the pH. It might work by providing a shot of potassium (in our chronically low K soils). For growers who absolutely cannot harvest early (before too many pods have formed, probably about June 10-15), this offers another management option.

Several growers asked if herbicides will work. Alan searched pesticide registries in 14 states, and still could not find any herbicide listed to control this species. Cost (if a legal option was available) and harvest interval might over-ride any benefits of using herbicide. In addition, herbicide use shouldn't affect the weed seed bank. Our limited experience suggests that seeds are short-lived, perhaps no longer than 2, possibly 3 years. We have not found any published seed viability study (in English, anyway).



The narrow, pointed leaves are toothed ("serrate" say botany texts).  
Photo: Alan T. Eaton

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## ***Did You Know?***

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Mature seed pods turn tan, and the loose seeds rattle when the pods are shaken. Photo: Alan T. Eaton.



**Carl Majewski is measuring grass height in a Walpole field. Photo: Alan T. Eaton.**

We were intrigued by fungus-killed YR plants in two sites that we checked: Lancaster and Brentwood. Initially we thought it was a downy mildew that might be useful as a management tool. Follow-up observations in 2013 showed it was a common pathogen (*Rhizoctonia*) and probably not likely to be useful for control.

Several growers asked if the plant is toxic to livestock. Steve had investigated that question earlier. European references indicate that the plant does contain (toxic) glycosides. But we cannot find any reference of plants toxic to livestock that lists this plant. We might be cautious about allowing livestock to eat a lot of hay baled from a heavily infested site. We do not know if it is distasteful to them.

An excellent way to move YR seeds is on farm equipment. One observation supporting this was in a Strafford county field. It had a very heavily infested 10' X 18' patch, right where mowing equipment is parked as it enters/leaves the field. A careful search of the rest of the six acre field turned up only three plants. One seacoast farmer has seen the plants sprout from manure of cattle that were fed YR-infested hay.

What about controlling this with fire? If it were done when plants were mature (or almost), and seed pods had not shattered, it might (?) be very effective. But that is probably late June to early July, when the vegetation is still quite succulent, and harder to get burning. For years, lowbush blueberry growers here used kerosene applied with "indian pumps" to burn and renovate their fields. It brought on its own set of problems, like permits, smoke, threat to wildlife, and safety issues.

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## ***Did You Know?***

**Mow affected fields early, 2 years in a row. We think YR seeds are short-lived.**

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### **If you find a significant amount of yellow rattle in your fields:**

- Mow affected fields early, 2 years in a row. We think YR seeds are short-lived.
- When cutting/tedding/baling in an infested field in June or July, clean off equipment thoroughly before moving to another. The risk goes way down after the first cut.
- Try to make mowing height fairly low (4" if possible) without risking scalping.
- When mowing, do your best to avoid skips at field edges and other tight spaces.
- If early haying is not an option, and YR population is high, consider a heavy ash application (3 tons/acre).
- Consider looking at other hay species seed mixes. YR problems seem more severe in bunch-type grasses, such as timothy and orchard-grass. Sod-forming grasses (like brome grass and low alkaloid reed canarygrass) seem to be affected less.
- Monitor soil pH and fertility, and follow soil test recommendations in order to promote vigorous growth of forage plants.

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**To preventing YR from moving into your hay fields:**

- Survey your fields for this plant, in the first half of June (before mowing).
- If your haying mowing equipment is used on fields that are infested, clean it off before mowing uninfested fields, for the first cutting of the season.



**Top Photo: Steve Turaj is in a very heavily infested field. All of the yellow flowers are YR. There's not much grass left. Bottom photo: Steve shows a YR plant that has been killed by downy mildew. The brown flecks on leaves and seed pods of adjacent YR plants might be signs of infection as well. Photos: Alan T. Eaton.**



**Liz Puris is about to throw her sample ring in a Westmoreland field.  
Photo: Alan T. Eaton.**

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### **About the Author**

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