

A SURPRISING WEED, YELLOW RATTLE

By Steve Turaj
July, 2010
UNH Cooperative Extension
Coös County

More melodramatic titles for this article were suggested by those contending with it. "Rattlers in the Short Grass", "Vampires Hidden in the Hayfield", "The Weed that Ate England". Imaginations can run high when hiking about an infested field, one you've been counting on for a good harvest of baled hay.

Yellow or Hay Rattle is a member of the Scrophulariaceae Family, Genus *Rhinanthus*. My old copy of Gray's Botany lists four different species being found in this region. Whether native or introduced, they have been present in New England fields for sometime. Perhaps of interest to local botanists is that Pease's (1924) "Vascular Flora of Coös County" lists only one, and that found at the "heads of alpine ravines".

The descriptive name *Rhinanthus* is derived from the Greek meaning 'snout-flower'. At hay-making time that is one of its most distinguishing features: bright yellow snap-dragon flowers with a flattened, inflated calyx, attached to an upright stalk. As the season progresses these are transformed into dry papery bladders filled with seeds (as many as 240 per plant) which "rattle" in the wind. Another recognizable characteristic of the plant is its toothed edge, lance-shaped leaves arranged opposite one another on a stem.

It is an annual hemi-parasite; as such it is able to sustain itself thru photosynthesis. However it derives most of its subsistence by invading adjacent plant roots. (Grasses seem to be preferred hosts). As it extracts liquid nutrients from these plants they decline and die. This is where the vampire description comes into play.

I first identified it several years ago from a sample brought in "growing along the side of the road". It was not to be found in any of the 3 or 4 commonly used weed books of forage crops. A wild flower guide had the most, although limited information about it. An interesting but

seemingly inconsequential plant to most observers.

Little did we know it was patiently bidding its time, lurking about our hayfields waiting for an opportunity to strike! Sorry, started to devolve into melodrama again. To tell the truth I like to think of it as well, solving a mystery.

As hay mowing began this year – earlier than the last two, it's been drier - I was asked to look at what was once a nice grassy field. "Should be chest high Timothy and Orchard grass, instead some weed has taken over". Knowing these farmers take regular soil tests, fertilize accordingly and harvest on a timely schedule, I didn't think it was Bedstraw or another weed often seen in low management lands. A short walk out to the field with them and the problem was clear - Yellow Rattle.

Generally a rather puny looking plant it was most vigorous when growing amongst still surviving grass, quite short where most had been killed off. Clovers and other legumes like purple vetch, which seem to be more resistant, were (unexpectedly) colorfully visible.

So, what to do at that point? Get the word out, try to reduce its spread by seed from field to field, which can easily happen by usual hay-making activities. Local field crop farmers were notified in various ways, others thru media releases. Checking with Agronomists (forage crop specialists) in other locations revealed that this was not a localized problem. Since then a lot of us have been studying up on this surprising little weed.

What follows are a few likely questions and my attempts as an agricultural generalist, to reason out a possible answer (PA) from available information and observations. Hopefully we'll add to and improve these over time and with more experience. Let me know what you're seeing.

Q: Why was it a problem this year?

PA: The last two growing seasons were quite wet making it difficult to harvest hay until late summer. "Took first cut along with the second" was a common remark. As a result, Yellow Rattle set large quantities of seed, that being the

whole purpose of an annual plant's reproductive life cycle. I believe we were seeing hard-viable seed set by early July this year, in Coös County.

Openings in meadows, perhaps aggravated by the late cuttings and typical of bunch-grasses like Timothy and Orchardgrass allowed most of the dropped seed to germinate and grow. Open ground without canopy shading is what gives an annual weed their "time in the sun".

In years when the water supply is plentiful for an infected host plant (say Timothy during the last two years) it's said the water and nutrients removed may only have a localized effect. Under dry conditions (this year) things change, one reference says something like "the effect can be spectacular, but also unpredictable". That's because annual parasitic plants have no particular reason (unlike perennial parasites) to allow their host to survive. Therefore in order to set as much seed as possible -reproductive survival- they will "fully exploit" their host. This is done early in its growth stage, grass was hit hard.

One observer (somewhere on the internet) reported that Yellow Rattle came in after a drought knocked all their other plants back. My guess is that it was already there, but it took those dry conditions = stress to be fully revealed.

Q2: How do we control it?

PA: To begin with, compared to other crop weeds, there is not a whole lot of information available about control. However there is quite a bit on just the opposite - how to establish it to create a diverse community of plants in a meadow by weakening /eliminating grass competition. This seems quite popular in the United Kingdom judging from internet postings. On the British Museum poster 'Meadows' which hangs above my desk a Yellow Rattle plant is nestled (ominously) between Yarrow and Foxtail grass. By using reverse engineering so to speak – doing the opposite of what they recommend – perhaps we'll find some control ideas.

The few research based references I've gathered originate (understandably) in Europe where more weed pressure / and species appear to occur. I'll list a few of these at the end of the

article. That said here are a few strategies to consider.

A. Cutting Management (see reference #1 Magda 2004). It's believed that Yellow Rattle seed only remains viable for 3 years. "If cutting is scheduled to coincide with peak juvenile height, this can drastically reduce population density the next year and the population can be eradicated within 3 years". That would seem to account for the observed lack (so far) of Rattle in fields mowed very early in the season for first cut haylage. It's never been able to reach a reproductive stage and become established. I'm not sure how helpful this advice is to strictly dry baled hay farmers.

B. Crop changes – Can fields be rotated into something else, particularly non-grass that would be more resistant to infestation while the 3-year life of the weed seed bank is eliminated? Or, can we intercrop with a resistant, other hay-type forage crop which will canopy tall enough to shade out Yellow Rattle, while also slowing its transpiration rate / ability to function.

I don't believe a legume like Ladino or Red Clover would work because of their growth habits and dry baling difficulty. How about a hay variety of Birdsfoot Trefoil? I have seen healthy specimens growing along-side Rattle and it is a legume acceptable to horses. We'll be planning some patch trials in infested fields at a couple Coös farms – frost seeded in late winter.

C. Other possibilities: Fire: A farmer told me she had wondered about this approach. "Plenty of time for thinking when mowing hay, Steve". It is mentioned as an effective way to destroy viable seed on the soil surface – again attacking that seed bank (Reference #2 Press & Graves 1995). Looking at a heavily infested site shortly after mowing I was taken aback at just how many seeds and bladders littered the soil surface. Be nice to get rid of them right then. I hope someone with Fire Department connections will explore this approach.

Selective broad-leaf herbicides: Both to eliminate Yellow Rattle and others like Bedstraw and Dock which may follow in their wake. Reportedly, parasitic plants are most vulnerable at the seedling stage of their life cycle. A

herbicide which targets that time period to late juvenile could be useful, worth checking pesticide registration labels. Remember to follow up with a plan to establish a crop afterwards. "Nature abhors a vacuum", and will probably fill it with something unwanted.

Fertility management – Practical experience tells us a healthy plant is more resistant to infection. A soil test and lime / woodash / fertilizer applied accordingly are always worth it. Potassium, which tends to be low in most tests I've reviewed, plays an important role in disease resistance.

Biological control & Resistant varieties – Needs investigation, starting with a weed's probable place of origin is suggested. I'll be happy to tramp about fields in the United Kingdom and "take a look", just need someone to pick up the tab.

Grazing – Saved this for last since some mention is made of it as a control, or prevention strategy, like early mowing. I'm reluctant to recommend it, which leads to my final question.

Q3: Will it hurt my livestock?

PA: When walking about fields with farmers, weed identifications to prevent or because of suspected poisonings that's a common question. Cherries, Milkweed, Buttercup, Bracken Fern, there are a lot of weeds out there you don't want your animals feeding on. How big a problem are they?

In response I look to a favorite Renaissance Scientist: Paracelsus for advice. Considered 'The Father of Toxicology' he is quoted as saying "The Dose Makes the Poison". He knew many things had toxic qualities; it just depended on how much was used. "Poisonous Plants of Pennsylvania, Hill, 1986" lists many such rates (when known for various animals). Mercks and your local Vet are also information sources. I do not see Yellow Rattle mentioned although Foxglove, a member of the same family is cited.

However, my Euro-references are in agreement that *Rhinanthus* – Yellow Rattle has toxic qualities – glycosides. Yet there seems to be a

lack of clinical data regarding actual poisonings. That might be because it's not consumed at all (have heard 3rd hand that a horse will spit it out), not enough is consumed, or perhaps mechanically little is picked up at haying. "It is toxic to livestock. No organs at the adult plant stage are consumed by animals, either at grazing or in hay" (Reference 1).

I certainly wouldn't force my livestock to graze in a big patch of it, but a manageable risk? You decide.

References:

1. Magda, Dura, Theau 2004'. Defining Management Rules for Grasslands using Weed Demographic Characteristics', *Weed Science* 52: 339-345
2. Press and Graves 1995 'Parasitic Plants', Chapman and Hall London
3. Morgan, Westbury et al 'The Degradation of *Rhinanthus minor* in vitro, UReading, UK (Experiments with Yellow Rattle in feed).