



A Tale of Two Species

by
Pat Holloway

One of the more interesting and challenging parts of my job is answering the myriad of phone calls I get from all over Alaska and quite a few from the 'lower 48' states asking for all kinds of assistance. "How much reindeer manure can I add to a flat of potting soil in order to grow my bedding plants?" "How can I improve the fruit production in my field of lingonberries?" "How do I germinate wild iris seeds?" "I have a landscape business in Colorado and was awarded a contract to landscape Eielson Air Force Base. Tell me everything you know about hardy landscape plants in the next ten minutes!" Usually, I can answer the questions thrown at me. Some of them have me scrambling for my favorite reference books or contacting colleagues or local growers with more knowledge than me. Some are the catalysts for very interesting experiments in the botanical garden, and some just leave me speechless.



Hedysarum Mackenzii, Wild sweet pea (Heller 1953)

In September, I received a call from a gentleman in Waterloo, Iowa. He had viewed a program on national television about a young man, Christopher McCandless, who hiked into the back woods near Denali Park in 1992 with the intention of living off the land. Tragically, Mr. McCandless died of starvation about four months after starting his adventure. One of his final diary entries was, "Extremely weak. Fault of potato seed. Much trouble just to stand up. Starving. Great jeopardy." The national newscasters hinted that the potato seeds might have caused or exacerbated his starvation and prevented him from seeking help. My enterprising Iowa caller thought these seeds might be a dieter's dream come true! He wanted to find out more about these potato seeds so he could package and sell them as appetite suppressants!

Normally, I don't follow up on calls such as this. I tried to convince the Iowan that even strychnine would suppress a person's appetite, but I wouldn't take it no matter how badly I wanted to lose a few pounds! However, his call reminded me of another conversation I had a few years ago with a graduate student in the UAF chemistry department. Edward Treadwell contacted the Botanical Garden to see if we had any collections of *Hedysarum alpinum* and *H. Mackenzii* seeds. The "potato" in Mr. McCandless' diary was the Indian potato, *Hedysarum alpinum*, historically one of the most widely harvested wild plants in Alaska. In fact, the present site of the UAF campus was once called *Troth Yeddha* or wild potato hill by the Athabascan Indians because it was a favorite harvesting place for Indian potato roots. As part of Mr. Treadwell's Master's Thesis, he wanted to explore the newscaster's claims that the seeds of the edible Indian potato contributed to Mr. McCandless' death. It just so happened that we had an abundance of seeds from both species. Although the roots are definitely edible, the seeds might easily contain a poisonous alkaloid.

The story of the two *Hedysarum* species has one more twist that dates back a century to Arctic Explorer, Sir John Richardson. Members of the Richardson Expedition became ill following a dinner made from roots of *H. Mackenzii*, the wild sweet pea. Every amateur and professional botanist in the Far North has heard of the poisonous nature of this plant, although not one study has ever been conducted to identify the poison. The story of the explorers' illnesses has been passed down, unchallenged, and is repeated in many Alaska references (i.e. Heller 1953, Kari 1991). Since both the edible and poisonous species are found growing in the same regions, often right next to each other, it seems odd that there are no accounts of accidental poisoning by native residents or recent immigrants anywhere in Alaska. Treadwell wanted to find out if any of these claims

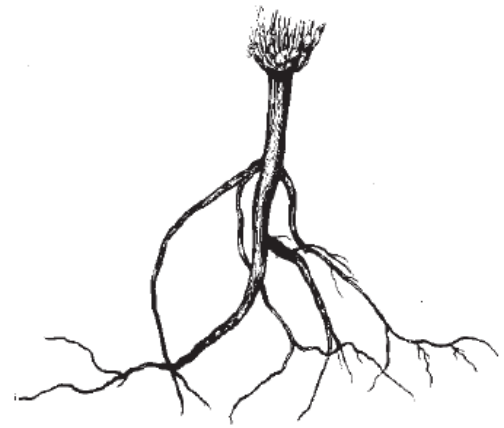
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for either species was true.

The two *Hedysarum* species belong to the Legume plant family, some members of which are notorious for causing birth defects and death in livestock. More than 450 poisonous alkaloids have been found in the 18,000 members of the Legume plant family (Treadwell 1996).

Mr. Treadwell subjected his seed samples to a diversity of chemical tests to determine if alkaloids were present in seeds of one or both species of *Hedysarum*. He also tested the roots and shoots of both species to identify possible toxic chemicals that might occur in the wild sweet pea but not in the Indian potato. Treadwell found that neither species of *Hedysarum* contain any alkaloids. He conducted a battery of tests on roots and seeds that all came out negative. He found no difference in chemical composition of roots and seeds of the Indian Potato. Therefore, it is not true that the roots are edible, and the seeds are poisonous. Analysis of root extracts from both species showed very little differences between the wild sweet pea and Indian potato, and there was no evidence of a toxic component in wild sweet pea.

Treadwell found nothing in his analysis that would lead to the conclusion that the Indian potato seeds Mr McCandless ate caused him to become sick or lose his appetite. Mr. McCandless most likely starved to death because he simply could not gather enough calories from wild plants to survive. Students in NRM 101, Natural Resources Conservation and Policy, this semester learned that a person would have to eat more than 25 pounds of willow bushes **each and every day** to maintain enough calories to survive on plants alone. Chances are a bit higher with Indian potato roots; one needs to harvest about four pounds of roots per day to meet minimum calorie requirements. Assuming one could find large fields of Indian potato plants, digging the long, skinny roots is hard work, and harvests measure in the ounces per plant, not pounds. Most indigenous people knew how hard it was to harvest Indian potato roots, so they raided mouse caches or searched river banks for exposed roots. For Mr. McCandless, a handful of Indian potato seeds just wouldn't be enough to survive.



Hedysarum alpinum, Indian potato (Heller 1953)

Mr. Treadwell's research also calls into question the long-held belief that wild sweet pea is poisonous. He found no evidence that it differed substantially from the Indian potato in chemical composition. He speculates it was something else in the stew pot that made Richardson's expedition so ill. The early journals describe other components of their diet: lichens, leather, rotten meat, fish entrails, and warble-fly dung. I cannot imagine even suspecting wild sweet pea roots as the culprit with a diet like that!

Poisonous or not, there is no evidence in any ethnobotanical research that wild sweet pea was ever used by indigenous people for food or medicine. Chemistry professor, Tom Clausen, speculates this has to do more with plant morphology than existence of a poison. The wild sweet pea has a smaller, much-branched root system (2 cm diameter) as opposed to a bigger, less branched system in Indian potato (up to 5 cm diameter). It simply might be easier to harvest Indian potato than wild sweet pea. As for my Iowa acquaintance, I had to tell him Indian potato seeds probably would not become the next great organic diet pill. The moral of this story is that no question is too outrageous. I learned quite a lot from one man's question!

References Cited:

- Heller, Christine. 1953. *Wild Edible and Poisonous Plants of Alaska*. Alaska Cooperative Extension Service, Fairbanks, AK.
Kari, Priscilla. 199. *Tanaina Plantlore*. Alaska Native Language Center, Alaska Natural History Association and National Park Service, Anchorage, AK.
Treadwell, Edward. 1996. Phytochemical Investigation of *Hedysarum alpinum*, *Hedysarum mackenzii* and *Colophospermum mopane*. MS Thesis. University of Alaska, Fairbanks.

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