DETERMINING BEST PROTOCOLS FOR WILD SEED COLLECTION AND METHODS FOR CALCULATING SEED VALUE

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In northern Canada, mineral extraction is expected to increase 91% from 2011 to 2020 (Rhéaume and Caron-vuotari, 2013). One result of mine development in remote regions is a demand for new research into mine rehabilitation. Revegetation is an important component of restoration. Non-native plants have been commonly used for landscape rehabilitation following disturbance. They are available for a low cost and in large quantity compared to similar native species (Ewel and Putz, 2004). In some cases non-native plants will function superiorly to a comparative native species, such as in rapid growth and establishment (Asay et al., 2001). However, non-native plants may be highly competitive and may spread to invade natural environments nearby, altering their composition and diversity (Flory and Clay, 2009).

Using native plants in revegetation is becoming more common practice (Peppin et al., 2011). Their seeds may be bought commercially or locally collected. Commercially grown native seeds are sometimes available at lower costs compared to locally obtained seed; however, their adaptation to local climate conditions may mean they are not suitable for planting in different growing regions (Belnap, 1995). The distance between genetically distinct populations can be as minimal as 20km (Krauss and Koch, 2004). In some cases, seeds with non-native genotypes are superior to native populations and may become invasive or outcross with local genotypes. Commercial sources for native seed are often difficult to find, especially within a suitable genetic provenance (<100km) (Krauss and Koch, 2004) for remote locations. Local seed collection may be required.

Local seed collection occurs for two main ecological reasons: preservation and rehabilitation. Species that are at risk of becoming extinct, are being preserved through seed collection and stored using ex–situ (seed banks) or in-situ (controlled natural environments) methods (Volis and Blecher, 2010). Plant communities within rare or frequently exploited habitats are collected from, in order to preserve the unique population genetics (Mattner et al., 2002, Volis and Blecher, 2010). More recently remote mines have begun on site seed collection programs for their mine revegetation. Collecting seed from wild sources differs greatly from collecting on uniformly planted, monocultures in a commercial setting. Collection and processing protocols as well as seed economic value are based on species specific plant and seed attributes that are not well described (Ross, 2004). These differences in plant attributes contribute to the effort required in obtaining seed and thereby alter seed value. Do Espirto Santo et al. (2010) examined several plant attributes to assess a value in price/kg of seed for several wild species. The seed value was used to aid in fair seed marketing for local business and individuals. Further knowledge regarding specific storage, collection, and ecological requirements of wild plants is required to ensure a successful seed collection program and promote industry development (Kauth and Perez, 2011).

The purpose of the study is to determine best protocols for collecting, processing, storing, and germinating seed from local, wild sources for approximately 50 species. These are critical aspects in the success of a remote seed collection program. In this study we will also determine how we can evaluate and quantify physical and ecological differences between species to determine a seed value. Seed value can be used for both species prioritizing in mine reclamation and for the development of local businesses.

Field studies will be conducted in 2016 at De Beers Victor mine, located in the Hudson Bay Lowland. We will examine regional plant characteristics such as: habitat and soil preferences, fruit maturation times, and Cree names. We will calculate seed value by evaluating key attributes that affect time and cost of using wild seeds including: regional plant abundances, fruiting characteristics (Fig. 1), requirements for identification, ease of processing and storing seeds, and the species contribution to reclamation. Attributes will be scaled from 1 to 10 and contribute to a relative seed value.

Figure 1.Photo (left) displaying poor ripening synchronicity of star false Solomon's seal (*Maianthemum stellatum*). (right) Diaspore persistence attribute; majority of berries quickly dispersed after ripening for red currant (*Ribes triste*).

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