

RECLAMATION RESEARCH
AT BREMDA MINES LTD.

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RECLAMATION RESEARCH AT BRENDA MINES

The objectives of the reclamation program at Brenda Mines are:

- to determine through research trials the most practical end land use that the various types of disturbed land are capable of supporting and
- to develop cost-effective methodologies for revegetating these materials.

Agronomic and native species trials were established in 1985 and 1986 on the range of material types, slopes and aspects which occur on the mine site. The results of some of these trials from two sites visited on the mine tour are presented here.

Site #1 Resloped Waste Dump

The results of a series of native species trials on resloped waste dump, north aspect, are presented in Figures 1 and 2. Fall planting was much more successful than spring for all species tested on this site, with good survival of Wild rose (*Rosa acicularis*) and Buffaloberry (*Shepherdia canadensis*) and moderate survival of Mountain alder (*Alnus viridis*) and Lodgepole pine (*Pinus conforta*) Survival rates have remained relatively constant over the past three years for most species, the greatest losses occur in the first season after planting.

Twelve species of agronomic grasses and legumes were established in a randomized split plot design on this slope in June 1986. Each species was planted in a 5 m² plot and replicated three times. An assessment of this trial in September 1987 (Table 1) indicated the superiority of two legume species and various grass species. A seed mix was derived from this data set and additional information on these species including growth form, competitiveness, nutrient requirements, and seed production. The resulting mix composed of:

Pubescent wheatgrass
Crested Wheatgrass
Canada Bluegrass
Sainfoin
Birdsfoot Trefoil

North Facing Resloped Waste Dump

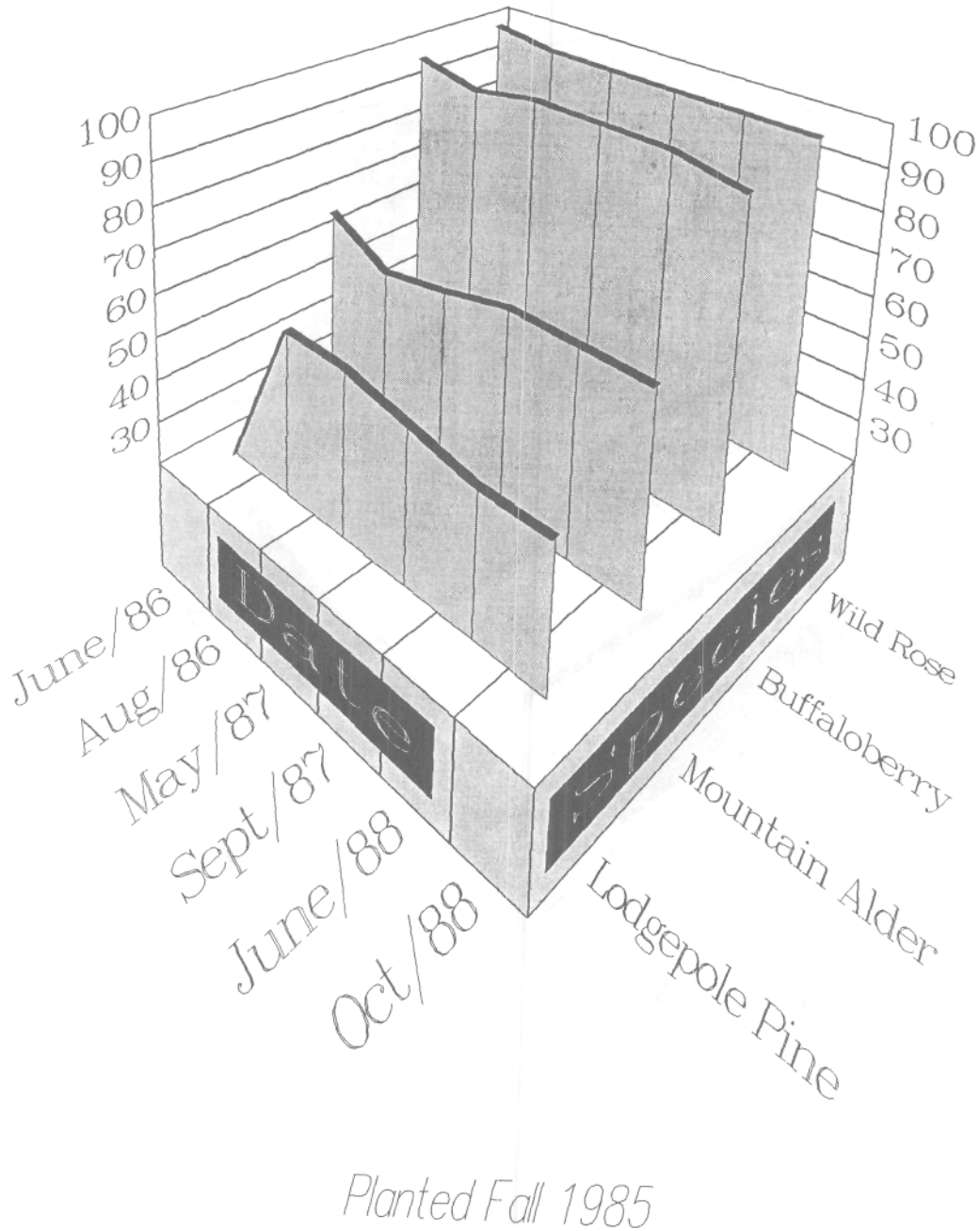
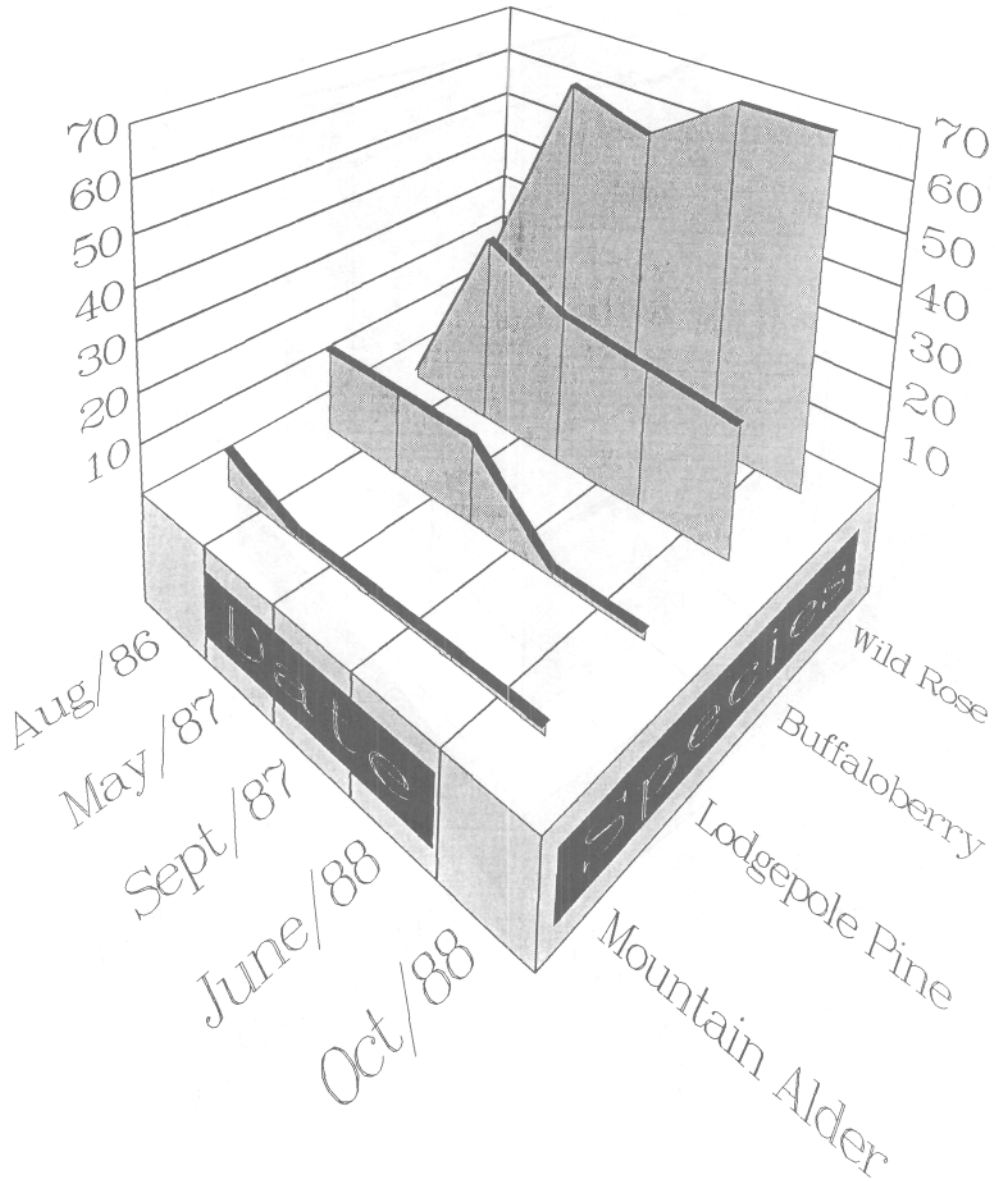


FIGURE 1
Percent Survival of Native Species

North Facing Resloped Waste Dump



Planted Spring 1986

FIGURE 2
Percent Survival of Native Species

TABLE 1
Percent Cover of Agronomic Species on a
North-facing Resloped Waste Dump,
Planted June 1986, Assessed Sept. 1987.

	Block A	Block B	Block C	Mean	S.D.
Rambler Alfalfa	10	15	20	15.0	5.0
White Clover	0	0	2	0.7	1.1
Perennial Lupine *	0	1	1	0.7	0.6
Sainfoin *	25	30	20	25.0	5.0
Birdsfoot Trefoil	25	35	20	26.7	7.6
Canada Bluegrass	15	20	20	18.3	2.9
Carlton Bromegrass	50	40	30	40.0	10.0
Creeping Red Fescue	50	40	50	46.7	5.8
Elka Perennial Rye	15	10	15	13.3	2.9
Climax Timothy	45	60	40	48.3	10.4
Crested Wheatgrass	30	40	40	36.7	5.8
Pubescent Wheatgrass	40	45	40	41.7	2.9

* seeded at one-half the rate of other species

was seeded in an operational scale trial on 2.5 hectares of this slope in May 1988. The area was fertilized with a composition 10:46:5 (N:P:K) at a rate of 400 kg/ha. Seeding and fertilizing was done using an agricultural tractor with a cyclone spreader. Excellent germination and growth was observed in the first season after planting.

The results of the agronomic and native species trials on this site indicate that a good establishment of ground cover and native trees and shrubs can be achieved on this and other similar sites.

Site 2 Tailings Dam

In 1985 and 1986 native and agronomic species trials were installed on the tailings dam. Many of the trials were lost due to drifting sand, but the results from some protected areas indicated that good growth could be achieved if the sand movement was controlled. In 1986 and 1987 a shallow till cap was applied to the crest of the dam and revegetated with a mix composed of:

Pubescent Wheatgrass
Nordan Crested Wheatgrass
Creeping Red Fescue
Hallmark Orchardgrass
Carlton Bromegrass
Rambler Alfalfa
Sainfoin

This mix was applied using an agricultural tractor equipped with a cyclone spreader and then the sites were harrowed. Fertilizer (11:55:10) was applied at a rate of 400 kg/ha with an additional 200 kg/ha applied in July. The site was irrigated as required throughout the growing season. Good growth was achieved, however other options for stabilizing the sand were investigated due to the high cost and limited availability of till materials. In 1988 a field scale trial of three reclamation techniques was carried out:

- hydroseeding
- drill seeding followed with an application of Curasol (synthetic resin) and

- drill seeding followed with an application of SS-1 (asphalt-emulsion).

Rates of application and cost of materials for each reclamation treatment is provided in Table 2. Assessment of the germination and growth of the agronomic seed mixture throughout the growing season indicated that the asphalt emulsion was the most successful, achieving both good germination and growth. A large operational revegetation program will be initiated in May 1989 using the asphalt emulsion in combination with drill seeding.

The reclamation program at Brenda Mines has determined, through inexpensive research trials

- successful species for seeding and planting on various
- types of waste materials,
- fertilizer requirements to promote good growth,
- timing of seeding and planting,
- cost-effective methodologies for sand stabilization.

These research efforts have been expanded to field scale trials to assess methodologies which will be practical for operational reclamation. Investment in large scale operational revegetation programs will be based on successful cost effective methods for achieving final reclaimed sites.

TABLE 2

Application Rates and Material Costs for Various
Reclamation Treatments on Tailings.

Treatment*	Material	Rate	Cost/ha **
Hydroseeding	Tackifier Mulch	145 Kg/ha 1100 Kg/ha	\$1,633
Curasol (using spray bar) (using hydroseeder)		300 l/ha 200-270 l/ha	\$1,270
SS-1 Asphalt emulsion		2272 l/ha	\$ 864

*Seed and fertilizer applied at same rates for all treatments:

Seed	35 Kg/ha
Fertilizer	400 Kg/ha

**Includes cost of seed and fertilizer