

# CCEMC/TIA Field Tour

Wednesday May 27<sup>th</sup>, 2014

## Huallen Seed Orchard (HASOC)

### Breeding Region Orchard For:

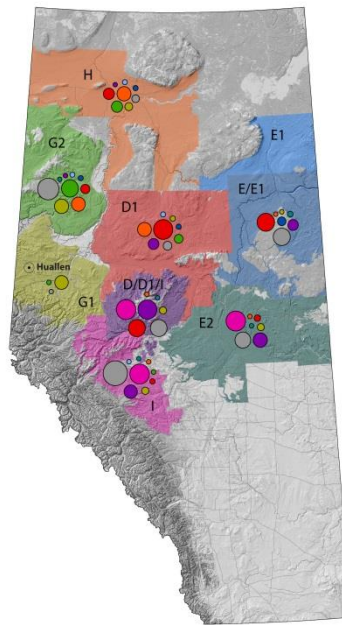
- Region G1 & I: White spruce
- Region B1 & B2: Lodgepole pine
- Region L2: Black spruce

### Environmental Conditions:

MAT: ~ 1.5°C  
MAP: ~ 490mm

### Climate change challenges

An important component of the overall analyses of the Control Parentage Program (CPP) is to determine if any of the current stock of parent material will likely perform poorly under expected climate projections for the Alberta. If true, the poor performing parents should be removed from the acceptable planting stock or only cautiously used in environments where they are currently adapted and will remain adapted in the future.



**Figure 1:** White spruce (*Picea glauca*) seed transfers tested within the provinces Control Parentage Program (CPP) regions. Colours represent the respective CPP regions, where grey represents parent material originating outside a CPP region. The size of the circles represent the number of unique parents tested in each region (presented in the accompanying table). Geographic reference for the Huallen Seed Orchard (HASOC) is also provided.

**Transfers among white spruce CPP regions**

From \ To	D/D1/I	D1	E/E1	E2	G1	G2	H	I
D/D1/I	111	49	48	75	0	2	1	68
D1	95	114	101	16	0	37	52	7
E/E1	0	6	32	0	0	6	6	0
E1	0	5	0	0	0	5	5	1
E2	1	0	10	1	0	1	0	1
G1	21	8	2	20	70	76	27	22
G2	0	33	0	0	2	96	52	3
H	1	72	1	1	0	73	74	2
I	116	0	0	116	0	0	0	116
Cypress Hill	1	1	67	1	0	1	1	1
BC	20	0	4	20	0	72	0	59
ON	6	0	0	6	0	19	0	25

The criteria for a parent to be considered for roguing are defined as follows:

- (1) The parent performs poorly in its CPP region of origin
- (2) Performance of the parent declines under seed transfer to a characteristically warmer CPP region
- (3) If the parent source climate is cold, at a high elevation or far north relative to its CPP region of origin

Criteria (1) and (2) consider the parent’s performance within transfers among the CPP regions (Figure 1), where criteria (3) considers the unique climate the parent is adapted to at its origin. Each of these criteria is independent and all conditions do not need to be met for a parent to be considered for roguing.

In general, we have determined that transfers of genotypes originating from southern, warmer climates to northern, cooler planting sites results in poorer performances compared to the use of local stock or genotypes originating in northern environments. Similarly when genotypes originating in wetter environments are transferred into drier environments they have poorer performance. Although these results are expected, standard errors indicate there is a relatively large variation among genotypes originating within a CPP, suggesting that rouging criteria (3) will need to be closely examined to develop a list of parents for potential roguing from the current breeding program.

**Table 1:** Change in white spruce performance as the result of seed transfers to/from Alberta’s G1 and I CPP regions.

OriginCPP	SiteCPP	Change in performance <sup>1</sup>	StdError <sup>2</sup>
G1	E/E1	-0.56	0.38
G1	E2	0.53	0.28
G1	G1	0.16	0.32
G1	G2	-0.18	0.20
G1	H	-0.91	0.31
G1	I	0.89	0.20
I	D/D1/I	0.51	0.22
I	E2	0.54	0.25
I	I	0.9	0.17

<sup>1</sup> Performance was measured as the relative height (i.e. the number of standard deviations away from the mean) within each trial series, averaged across all trial series within the CPP region (e.g. a positive value indicates the transfer resulted in an increased height compared to the mean of all trees in the trial series)

<sup>2</sup> Standard error indicates the variation in performance among trees