

EXPERIENCES WITH CANADIAN ALTASWEDE AND SWEDISH COMMERCIAL RED CLOVER IN FINLAND

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For several years the cultivation of red clover in Finland has been dependent to a great extent on imported seed. Prior to 1950 Sweden was the primary source of this seed. More recently there have been several years when seed of the Swedish single-cut, later flowering type was not available in sufficient quantities to supply the need for it in Finland. When this situation occurred Canadian Altaswede was used, a single-cut variety earlier in flowering habit than Finnish red clover.

The first Altaswede seed — a shipment of 200 tons — was imported by Finland in 1948. During the six-year period 1953—1958 an average of 226 tons of Altaswede seed was brought into the country annually. This represented 80 percent of the total red clover seed imported by Finland during the period. Of the balance, 13 percent was Swedish commercial and 7 percent was from the U.S.S.R. During the years 1953, 1957 and 1958 Sweden was not able to export any single-cut red clover seed to Finland (1).

The first trials comparing Altaswede and Finnish Tammisto red clover, the first Finnish bred variety, were arranged in Finland in 1948. The trials were at seven different experimental stations from Southern Finland to the Arctic Circle. The results of the trials planted in 1948—1950 were published in 1953 (2) and are summarized in Table 1. In first year leys the Altaswede was 8 percent lower in yield than the Finnish Tammisto red clover; in second year ley it was 21 percent lower. These results are collected in Table 1. Significance is estimated by the difference method using Fisher's *t*-table: * signif. 95 %; ** signif. 99 %; *** signif. 99.9 %

Table 1. Results from red clover variety trials (Tammisto, Altaswede) in Finland. Planting years 1948—50.

Year of planting	Variety	Winter survival		Dry matter yield		
		10—0		Tammisto kg/hectare = 100		Average
		1st winter	2nd winter	1st year	2nd year	
<i>Agricultural Research Centre, Department of Plant Husbandry, Tikkurila, latit. 60°18'</i>						
1948	Tammisto	9.4	6.5	6 950	8 020	7 490
				100	100	100
	Altaswede	7.9	2.5	90	67	78
—	Tammisto	9.2	7.0	6 780	8 700	7 740
				100	100	100
	Altaswede	8.4	3.8	100	76	86
1949	Tammisto	9.5	9.8	5 810	7 040	6 430
				100	100	100
	Altaswede	9.2	9.4	102	79	89
1950	Tammisto	6.4	7.9	3 940	3 160	3 550
				100	100	100
	Altaswede	6.8	7.0	109	88	97
<i>Tammisto Plant Breeding Station, Helsingin pit., latit. 60°17'</i>						
1948	Tammisto	9.5	9.9	7 060	6 870	6 970
				100	100	100
	Altaswede	9.0	9.7	93	91	92
1950	Tammisto	9.9	9.8	2 940	7 910	5 430
				100	100	100
	Altaswede	9.6	9.2	99	96	98
<i>Agricultural Research Centre, Department of Plant Breeding, Jokioinen, latit. 60°49'</i>						
1948	Tammisto	7.6	9.7	7 900	5 100	6 500
				100	100	100
	Altaswede	7.1	9.3	91	70	83
1949	Tammisto	9.8	9.8	5 560	3 610	4 590
				100	100	100
	Altaswede	10.0	9.8	97	70	86
<i>South Ostrobothnia Agricultural Experiment Station, Ylistaro, latit. 62°57'</i>						
1948	Tammisto	6.0	5.5	8 550	5 250	6 900
				100	100	100
	Altaswede	3.0	2.2	62	61	62
<i>Pasture Experiment Station, Mouhijärvi, latit. 61°31'</i>						
1948	Tammisto	8.4	8.8	6 720	5 610	6 170
				100	100	100
	Altaswede	7.0	6.6	83	59	72
<i>North Ostrobothnia Agricultural Experiment Station, Ruukki, latit. 64°41'</i>						
1950	Tammisto	6.3		7 010		
				100		
	Altaswede	6.3		95		

Year of planting	Variety	Winter survival		Dry matter yield		
		10-0		Tammisto kg/hectare = 100		
		1st winter	2nd winter	1st year	2nd year	Average
<i>Polar Circle Agricultural Experiment Station, Apukka, latit. 66°35'</i>						
1948	Tammisto	9.0	8.0	3 440	4 000	3 720
				100	100	100
	Altaswede	8.0	6.5	93	76	84
1949	Tammisto	9.3	9.3	7 290	1 990	4 640
				100	100	100
	Altaswede	7.3	6.7	88	118	94
<i>Average</i>						
1948-50	Tammisto	8.5	8.5	6 150	5 610	5 840
				100	100	100
	Altaswede	7.7	6.9	92	79	85

Significance in dry matter yield

1st year

Tammisto—Altaswede 580 ± 252* kg/ha

2nd year

Tammisto—Altaswede 1120 ± 333** kg/ha

Table 2. Results from red clover variety trials (Tammisto, Altaswede, Swedish commercial) in Finland. Planting years 1952-56.

Year of planting	Variety or origin	Winter survival		Cutting dates		Dry matter yield		
		10-0				Tammisto kg/hectare = 100		
		1st winter	2nd winter	1st year	2nd year	1st year	2nd year	Average
<i>Agricultural Research Centre, Department of Plant Husbandry, Tikkurila, latit. 60°18'</i>								
1952	Tammisto	2.8	7.4	1/7, 7/8	10/7, 7/9	4 010	4 510	4 260
	Altaswede	1.8	5.0			74	56	65
	Swedish commercial	1.8	6.0			83	78	81
1953	Tammisto		8.2	7/7, 26/8	20/7, 14/9		6 030	6 030
	Altaswede		3.6				63	63
	Swedish commercial		6.3				82	82
1954	Tammisto	9.7	8.9	18/7, 9/9	4/7, 28/8	7 680	7 170	7 430
	Altaswede	9.7	7.8			96	82	89
	Swedish commercial	9.7	8.3			83	88	86
1955	Tammisto	4.3		9/7, 24/8		4 460		4 460
	Altaswede	4.6				91		91
	Swedish commercial	1.6				87		87
1956	Tammisto	9.5		2/8, 17/9		9 920		9 920
	Altaswede	7.5				77		77
	Swedish commercial	9.0				77		77
<i>Tammisto Plant Breeding Station, Helsingin pit., latit. 60°17'</i>								
1953	Tammisto	7.8	8.7	7/7, 19/8	19/7	5 800	4 480	5 140
	Altaswede	5.9	4.3			85	46	66
	Swedish commercial	5.5	6.0			83	54	69

Year of planting	Variety or origin	Winter survival		Cutting dates		Dry matter yield		
		10—0				Tammisto kg/hectare = 100		
		1st winter	2nd winter	1st year	2nd year	1st year	2nd year	Average
1955	Tammisto	6.0		16/7, 30/8		2 520		2 520
	Altaswede	3.0				57		57
	Swedish commercial	5.9				115		115
<i>Agricultural Research Centre, Department of Plant Breeding, Jokioinen, latit. 60°49'</i>								
1953	Tammisto	4.3	6.2	16/7, 21/9	14/7	6 830	1 980	4 410
	Altaswede	2.3	1.6			77	32	55
	Swedish commercial	3.3	2.4			78	45	62
1955	Tammisto	9.0	7.2	6/7, 24/8	8/7, 10/9	4 720	9 410	7 060
	Altaswede	8.5	5.8			90	86	88
	Swedish commercial	8.4	5.4			110	73	92
1956	Tammisto	7.3		9/7, 9/9		11 400		11 400
	Altaswede	7.0				85		85
	Swedish commercial	7.4				98		98
<i>Fiskars Farm, Pohja, latit. 60°06'</i>								
1954	Tammisto	8.5	9.1	13/7	10/7, 28/8	5 620	6 320	5 970
	Altaswede	7.5	8.1			90	94	92
	Swedish commercial	8.0	8.8			88	93	91
1955	Tammisto	5.5	4.4	12/7, 29/8	8/7, 4/9	3 630	3 960	3 800
	Altaswede	5.5	1.8			105	88	97
	Swedish commercial	6.2	3.7			111	92	102
—	Tammisto	6.0		10/7, 28/8		6 230		6 230
	Altaswede	4.8				84		84
	Swedish commercial	6.0				103		103
<i>Carelia Agricultural Experiment Station, Anjala, latit. 60°42'</i>								
1955	Tammisto	4.6		13/7, 20/9		6 460		6 460
	Altaswede	1.7				69		69
	Swedish commercial	2.5				93		93
<i>Häme Agricultural Experiment Station, Pälkäne, latit. 61°20'</i>								
1956	Tammisto	8.8		4/7, 4/9		9 820		9 820
	Altaswede	9.4				94		94
	Swedish commercial	7.9				67		67
<i>South Ostrobothnia Agricultural Experiment Station, Ylistaro, latit. 62°57'</i>								
1953	Tammisto	7.1	4.6	5/8	9/8	8 000	6 560	7 280
	Altaswede	3.6	2.3			78	82	80
	Swedish commercial	6.2	2.7			104	94	99
1956	Tammisto	9.3		6/8		11 250		11 250
	Altaswede	8.0				86		86
	Swedish commercial	8.6				97		97
<i>North Savo Agricultural Experiment Station, Maaninka, latit. 63°09'</i>								
1954	Tammisto	4.4	2.8	29/7	16/7	5 820	6 860	6 340
	Altaswede	1.4	0.6			86	70	78
	Swedish commercial	3.9	1.5			101	85	93
1955	Tammisto	4.6	8.8	12/7	29/7	5 280	8 010	6 640
	Altaswede	2.4	6.4			87	81	84
	Swedish commercial	4.3	8.1			87	88	88
1956	Tammisto	7.8		30/7		7 470		7 470
	Altaswede	5.5				81		81
	Swedish commercial	4.5				62		62

Year of planting	Variety or origin	Winter survival		Cutting dates		Dry matter yield		
		10—0		1st	2nd	Tammisto kg/hectare = 100		
		1st winter	2nd winter	1st year	2nd year	1st year	2nd year	Average
<i>North Ostrobothnia Agricultural Experiment Station, Ruukki, latit. 64°41'</i>								
1954	Tammisto	4.4		30/7		4 020		4 020
	Altaswede	3.0				74		74
	Swedish commercial	3.2				71		71
<i>Polar Circle Agricultural Experiment Station, Apukka, latit. 66°35'</i>								
1954	Tammisto	6.0		2/8	21/7	2 600	2 570	2 580
	Altaswede	5.8				82	66	74
	Swedish commercial	4.8				82	74	78
1955	Tammisto		7.7	31/7	30/7	6640	5 110	5 870
	Altaswede		6.2			93	66	80
	Swedish commercial		7.0			104	87	96
<i>Average</i>								
1952—	Tammisto	6.3	7.0			6 380	5 610	6 370
1956	Altaswede	5.0	4.5			84	70	79
	Swedish commercial	5.6	5.5			90	79	86

Significance in dry matter yield

1st year

Tammisto—Altaswede $1000 \pm 133^{***}$ kg/ha

Tammisto—Sw.comm. $700 \pm 220^{**}$ »

2nd year

Tammisto—Altaswede $1450 \pm 176^{***}$ kg/ha

Tammisto—Sw.comm. $1010 \pm 177^{***}$ »

In 1953, after a lapse of five years, Altaswede seed was imported again, at which time new trials were started in Finland. Since then trials have been planted each year. These have been at 10 experimental sites, the northernmost at the Polar Circle Agricultural Experiment Station (latitude 66° 35'). The most extensive tests have been located at the Agricultural Research Centre, Department of Plant Husbandry, Tikkurila in Southern Finland. Tests established at the different experimental sites during each of the past five years included Finnish Tammisto red clover as the standard, Altaswede and imported Swedish commercial red clover, representing the single-cut late flowering type.

The plot size has been 10 square meters and usually included 5 replications. A greater part of the trials were planted with a companion crop.

The tests in Southern Finland were cut twice during the growing season; the main crop during the early flowering stage, and the regrowth at the end of August or in September. The tests in Middle and Northern Finland were harvested once each season usually during the last part of July or early August. At most locations the clover was harvested for two seasons.

Winter survival for the different clovers was estimated at the beginning of each growing season. A scale of 10—0 was used with 10 representing no injury and 0 complete killing. In addition to the dry matter yields the amount of crude protein in the forage was determined for some of the trials. The results from 22 trials conducted during 1952—1956 are given in Table 2.

In the trials during the 1952—1956 period winter survival in the first and second year leys averaged 6.3 and 7.0 for Tammisto, 5.0 and 4.5 for Altaswede, and 5.6 and 5.5 for Swedish commercial, respectively. The difference in winter survival in these trials between Altaswede and Tammisto was much greater than in earlier trials because of the several severe winters for red clover in the 1950's. This can be noted by comparing the results given in Tables 1 and 2. Thus the results on winter survival from all trials show conclusively that the injury to Altaswede has been extremely heavy during the second winter.

Winter survival of the Swedish commercial red clover has been surprisingly poor. Data show it to be more comparable to Altaswede than to Tammisto in winter survival although the extent of the differences varied between trials.

Differences in forage yields have been significant among the three sources of red clover seed tested. The dry matter yield of Tammisto red clover averaged, in first year leys, 6.380 kilos per hectare (5620 lbs/acre) and in second year leys 5.610 kilos per hectare (4940 lbs/acre). In comparing the dry matter yield of first year leys, Altaswede and Swedish commercial were 16 % and 10 % lower, respectively than Tammisto. In second year leys the difference in yields was even more pronounced for Altaswede yielded 30 percent less and Swedish commercial 21 percent less. When the total yields for the first and second year leys are taken into account the yield of Altaswede was 21 percent lower and Swedish commercial 16 percent lower than the Finnish bred Tammisto variety.

Red clover is the most important legume plant in Finland, and it cannot be replaced satisfactorily by other species such as alfalfa. Thus in years following a short red clover seed crop in Finland it has been necessary to import red clover seed for forage production.

The results from the Finnish red clover trials indicate that the Canadian Altaswede and Swedish commercial red clover are not equal in winter survival and in forage yield to the Finnish Tammisto red clover.

For this reason seed production of the single-cut Finnish Tammisto red clover has been started abroad. Tammisto was ready for the market in 1937, but red clover seed production has been erratic in Finland due to the humid and rainy weather especially during harvest.

The experiences in producing seed of Tammisto red clover have been most satisfactory on the North American Continent — both in Canada and the United States. It is the plan to replace in the very near future the Canadian Altaswede and the Swedish commercial with North American-grown red clover seed of the Finnish bred Tammisto variety, to insure protein production in Finland (3).

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- (2) ——— 1953. Kokemuksia kanadalaisesta Altaswede-puna-apilasta. (Finnish). *Koetoim. ja käyt.* 4: 1. Helsinki.
- (3) ——— 1958. North America produces red clover seed for Finland. *Foreign Agriculture (U.S.)* Vol. XXI, 12: 13--14.

SELOSTUS:

SUOMESSA SAATUJA KOKEMUKSIA KANADAN ALTASWEDESTÄ JA RUOTSALAISESTA
PUNA-APILASTA

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Maatalouden tutkimuskeskuksen Kasvinviljelylaitos, Tikkurila

Tähän kirjoitukseen on koottu tuloksia Suomessa suoritetuista puna-apilan kantakokeista, joissa Tammiston puna-apilaa on verrattu kanadalaiseen Altaswedeeseen ja ruotsalaiseen kauppiasiemeneen.

Vuosina 1948—50 perustetuissa kokeissa antoi Altaswede 1. vuoden nurmessa 8 % ja 2. vuoden nurmessa 21 % heikomman kuiva-ainesadon kuin Tammisto (taul. 1). Vuosina 1952—56 kylvetyissä kokeissa oli taas 1. vuoden nurmessa Altaswede 16 % ja ruotsalainen puna-apila 10 % Tammistoa heikkosatoisempi vastaavien satoerojen ollessa 2. vuoden nurmessa Tammiston hyväksi 30 % ja 21 % (taul. 2).

Tähänastinen kanadalainen tai ruotsalainen tuontisiemen olisi mahdollisimman pian korvattava Tammiston puna-apilalla, jonka siementä ei Suomessa ole saatu lisätyksi, mutta jonka siemenviljelykokeilut ovat ulkomailla käynnissä.

MAATALOUSTIETEELLINEN AIKAKAUSKIRJA TOIMITUSKUNTA

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MAATALOUSTIETEELLISTÄ AIKAKAUSKIRJAA

ilmestyy 4 vihkoa vuodessa

Käsikirjoitukset lähetetään toimitussihteerille (os. Tikkurila) tai jollekin toimitusvaliokunnan jäsenelle

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