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HERBAGE SEED PRODUCTION POSSIBILITIES IN FINLAND

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Abstract

In the seed production variety experiments in Finland from 1977 to 1992 the mean seed yield of timothy (*Phleum pratense*) cultivar Alma was 717 kg ha⁻¹, of meadow fescue (*Festuca pratensis*) cv. Boris 622 kg ha⁻¹, of tall fescue (*Festuca arundinacea*) cv. Retu 350 kg ha⁻¹, of perennial ryegrass (*Lolium perenne*) cv. Riikka, of cocksfoot (*Dactylis glomerata*) cv. Haka 295 kg ha⁻¹, and red clover (*Trifolium pratense*) cv. Hankkijan Venla 403 kg ha⁻¹. From 1988 to 1998 annual certified seed production of timothy from 4599 ha was 1845 t in total at an average yield of 401 kg ha⁻¹. The meadow fescue seed production area was 1046 ha resulting in a yield of 470 t at an average of 449 kg ha⁻¹. In perennial ryegrass, small domestic demand has maintained the seed production area low. Herbage seed of timothy, meadow fescue, perennial ryegrass and red clover is produced in Finland for the domestic market only. In the 1950s and 1960s, however, Finland exported herbage seed. Exports ceased in the 1970s mainly due to high production costs in Finland. When Finland joined the European Union (EU) in 1995 the economical regulations in agriculture changed. A study on possibilities to produce herbage seed of foreign cultivars in Finland for export is currently in progress.

Keywords: Herbage seed production, meadow fescue, perennial ryegrass, timothy.

Introduction

The herbage seed production area in Finland is between latitudes 60 and 63 °N. The length of the growing season (base +5 °C) ranges from 180 to 150 days and the duration of permanent snow cover ranges from 110 days to 150 days. Denmark is one of the leading countries in herbage seed production (Burgon et al. 1998). The study of Skjelvåg (1998) indicates that the combined radiation and temperature index (RTI) does not differ very much between Ødum (56.3 °N), Denmark, and Helsinki (60.3 °N), Finland during the growing season. The values of RTI for Ødum and Helsinki for May, June, July and August were: 53 vs. 47, 73 vs. 70, 74 vs. 76, 68 vs. 62, respectively (Skjelvåg, 1998). The values for April and September, 14 vs. 4 and 43 vs. 28, show that the growing season starts earlier and continues longer in Ødum than in Helsinki.

Seed production of Nordic cultivars of timothy, meadow fescue and perennial ryegrass has been successful in Finland. Herbage seed yields in Finland are smaller than in Denmark, but the yield of alternative crops, like wheat (*Triticum aestivum*), are lower still in Finland than in Denmark. When Finland joined the European Union (EU) in 1995, the economical conditions for agriculture changed dramatically. Studies are in progress to clarify whether herbage seed production of cultivars of southern origin would be successful in Finland. This paper provides some information on the history and current situation of the seed production in Finland.

Material and Methods

As a part of the official variety testing programme, the seed production of grasses was tested from 1977 to 1992. Three seed yields were taken of a grass stand, and one or maximum two of a red clover stand. Recommended management was used for each species in the experiments. Experimental design was a completely randomised plot with four replicates. Plot

size was 13,75 m². This paper present, estimated mean yields of one cultivar of each species. Analysis of variance of data was performed according to for an incomplete block design and the block is incomplete since all varieties were not included in every experiment.

Using the statistics on commercial seed and wheat production in Nordic countries we calculated in the table 2, how much herbage seed yields are in percent of yield of wheat.

Results and Discussion

The mean seed yield in the variety testing experiments of timothy cv. Alma was 717 kg ha⁻¹ with a germination percentage of 90, which indicates that seed production potential of timothy is high in Finland (Table 1). The mean seed yield of perennial ryegrass, 637 kg ha⁻¹, in the variety experiments underestimates the seed production potential of perennial ryegrass, because only one or two harvests are usually taken of a perennial ryegrass stand and not three as in the variety experiments. The mean seed yield of perennial ryegrass in the commercial fields, 892 kg ha⁻¹, gives an better estimate of seed production potential of perennial ryegrass (Table 2). The seed yields of main grass species and wheat in Finland, Sweden and Denmark are presented in Table 2. The calculation how much the herbage seed yields are as percent of wheat yield suggests that in Finland herbage seed production would be an economically interesting branch of production in comparison with the alternative crops. Therefore, we reason that it might be feasible to produce herbage seed for export as well as for the domestic market.

Timothy and meadow fescue have been the most important species for seed production. Red clover and perennial ryegrass have also been produced to a minor extent. The area devoted to certified herbage seed production has been recently around 6 000 ha. For timothy the mean annual seed production area from 1988 to 1998 was 4600 ha, resulting in an annual production of 1 845 t at an average yield of 401 kg ha⁻¹. For meadow fescue the mean

annual seed production area from 1988 to 1998 was 1046 ha resulting in an annual production of 470 t at a mean yield of 449 kg ha⁻¹. Experience from perennial ryegrass cultivation indicates that seed production of cultivars of northern origin can be successful. The main factor limiting seed production has been the small domestic demand for perennial ryegrass seed.

Finland exported herbage seed from the 1940s to early 1970s, particularly of timothy. The seed production area was then around 25 000 ha. Annual seed production of timothy was on average 8 000 t of which 900 t was exported. In the early 1970's Finnish herbage seed production lost the capacity to compete in export markets due to high production costs. Possibilities to export to EU market are strengthened by the fact that the EU is currently importing herbage seed (Aamlid, 1999).

The main risk factor associated with the Finnish climate is winter damage caused either by ice encasement of stands or by snow mould fungi destroying the stands when snow cover duration is long (Niemeläinen, 1991). The risks are small for timothy and meadow fescue but could be high for perennial ryegrass. For species that have a dual induction requirement (Heide, 1994), as meadow fescue, the conditions in Finland may be critical for the primary induction in autumn. Studies are in progress to investigate possibilities for seed production of a range of foreign cultivars of timothy, meadow fescue and perennial ryegrass in Finland. The main issues in the study are to clarify the overwintering ability and to assess lateness of maturity. Preliminary data will be available in the summer 2000.

In Finland herbage seed production is economically more competitive than cereal production. Currently herbage seed is produced only for the domestic market. In the near future it will be shown if herbage seed production of foreign cultivars for export will be biologically and economically feasible.

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Table 1 - Estimated mean seed yields and germination percentage of one variety in each species in seed production variety experiments of timothy, meadow fescue, tall fescue, perennial ryegrass, cocksfoot, and red clover in Finland in 1977-92.

	Seed yield kg ha ⁻¹	Germination percentage %
<i>Phleum pratense</i>		
Alma	717	90
<i>Festuca pratensis</i>		
Boris	622	87
<i>Festuca arundinacea</i>		
Retu	350	88
<i>Lolium perenne</i>		
Norlea	637	88
<i>Dactylis glomerata</i>		
Haka	295	75
<i>Trifolium pratense</i>		
Hankkijan Venla	403	79

Table 2 - Seed yield (kg ha⁻¹) of timothy, meadow fescue, perennial ryegrass, and wheat in Finland, Sweden and Denmark in 1988-97.

	Finland	Sweden	Denmark
	-----Seed yield (kg/ha)-----		
Timothy	392	522	538
Meadow fescue	459	717	876
Perennial ryegrass	892*	1029	1151
Wheat**	3475	5888	7018
Seed yield as percent of wheat yield:			
Timothy	11	9	8
Meadow fescue	13	12	12
Perennial ryegrass	26	17	16

* Perennial ryegrass value in Finland for years 1993-97

** Wheat yields are from FAO production year books in 1989-1998.