WEED SEED OCCURRENCE IN COCKSFOOT SEEDLOTS

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SUMMARY

Weed seeds are a major reason for cocksfoot (*Dactylis glomerata*) seedlots being rejected from certification. An analysis was made of the occurrences of weed species in all cocksfoot seedlots tested at the Official Seed Testing Station, Palmerston North during 1989 and 1990. The major weed species were Yorkshire fog (*Holcus lanatus*) and soft brome (*Bromus hordeaceus* syn. *B. mollis*). Docks (*Rumex* spp.) and hairgrass (*Vulpia* spp.) were also prevalent. The occurrence of noxious and undesirable weed seeds is reported.

Keywords: cocksfoot, orchard grass, *Dactylis glomerata,* weed seeds, *Holcus lanatus*

INTRODUCTION

Exports of cocksfoot seed contributed almost $600,000 to the New Zealand economy in 1990. Over 80% of the exported seed was sent to Australia, and 10% to Chile. Lesser amounts of seed were exported to the USA, Ecuador, The Netherlands, Argentina, The Federal Republic of Germany, Peru, South Africa and Nepal during 1989 and 1990.

The area planted in cocksfoot in New Zealand has increased steadily during the last five years and has now reached 1660 hectares. The increase reflects the release of two new cultivars of cocksfoot, 'Grasslands Kara' (for dairy pastures) and 'Grasslands Wana' (for sheep pastures). Although bred for New Zealand conditions these two cultivars are performing well overseas. There are good prospects for expanding export trade in cocksfoot, but expansion will be possible only by maintaining high seed quality and competitive prices.

Weed ingress is one of the main problems in herbage seed production (Cocks 1969) and is a major cause of white clover and ryegrass seedlots being rejected from certification (Rowarth *et al* 1990a and b). However, apart from a ranking of weed seed occurrence (Dingwall 1969), no comparable data exist for cocksfoot seedlots. This survey reports on the nature and extent of weed seed contamination in cocksfoot seedlots submitted for certification.

METHOD

The frequency and type of weed seeds in cocksfoot seedlots were analysed in 191 (1989) and 204 (1990) purity testing results issued by the Official Seed Testing Station. These results were compared with a survey done in 1969 (Dingwall 1969).

RESULTS AND DISCUSSION

Twenty-six of the weed species whose seeds occur frequently in cocksfoot seedlots (measured during purity analysis (Young *et al* 1984) at the Official Seed Testing Station) are listed in Table 1. Although data taken from consecutive years do not necessarily reflect true trends, the fact that changes in occurrence of most weed species is small gives validity to the exercise. Of particular interest is the fact that the most common contaminants in 1990 and 1989 were also the most common in 1969.

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TABLE 1: Occurrence (%) of weed species in cocksfoot seedlots analysed at the Official Seed Testing Station in 1969, 1989 and 1990.

Common name	Botanical name	Occurrence (%) 1969	1989	1990
Yorkshire Fog[1]	*Holcus lanatus*	1[3]	37.7	50.5
soft brome[1]	*Bromus hordeaceus*[4]	2	44.5	45.6
docks[2]	*Rumex* spp	3	29.8	27.0
vulpia hairgrass[1]	*Vulpia* spp	5	18.3	22.1
field pansy	*Viola* spp		13.1	20.6
tall oat grass	*Arrhenatherum* spp		9.9	17.6
annual poa	*Poa annua*		7.3	12.7
sheep's sorrel	*Rumex acetosella*		12.6	12.7
prickly sow thistle	*Sonchus asper*		5.8	11.3
couch	*Elytrigia repens*		12.0	9.3
sweet vernal[1]	*Anthoxanthum odoratum*	4	12.6	6.4
fathen	*Chenopodium album*		5.8	6.4
hawksbeard	*Crepis capillaris*		4.7	5.9
field madder[1]	*Sherardia arvensis*		4.2	5.4
nipplewort	*Lapsana communis*		<3.0	5.4
shepherd's purse	*Capsella bursa-pastoris*		3.1	4.9
catchfly	*Silene gallica*		3.1	4.9
hedge mustard[2]	*Sisymbrium officinale*		<3.0	4.4
mouse-ear chickweed	*Cerastium* spp		<3.0	3.9
Californian thistle[1]	*Cirsium arvense*		<3.0	3.9
lesser canary grass	*Phalaris minor*		0	3.9
chickweed	*Stellaria media*		5.8	3.9
speedwell	*Veronica* spp		<3.0	3.9
wireweed	*Polygonum aviculare*		3.7	3.4
Australian flax	*Linum bienne*		5.2	<3.0
hawkbit	*Leontodon taraxacoides*		3.7	<3.0

[1] noted as difficult to remove from cocksfoot (Hartley 1969)
[2] noted as easy to remove from cocksfoot (Hartley 1969)
[3] in order of frequency, 1 being most common (Dingwall 1969)
[4] the Official Seed Testing Station reports soft brome as *Bromus mollis* on Certificates of Analysis in accordance with the International Seed Testing Association list of stabilised names.

Yorkshire fog appeared in 50% of samples in 1990, increasing from 38% in 1989. Soft brome, docks and hairgrass occurred in approximately 45, 30 and 20% of samples, respectively, in both years. The frequent occurrence of these seeds is a reflection of their widespread occurrence in the field (Healy 1969; Webb *et al* 1988), plus the difficulty of removing their seed from cocksfoot seed because of similarity in seed physical characteristics. Yorkshire fog, soft brome, vulpia hairgrass, sweet vernal, field madder, Californian thistle and nodding thistle, have been noted as being difficult to remove from cocksfoot (Hartley 1969). However, docks and hedge mustard have been noted as being easy to remove, yet docks appeared in 30% of all samples and hedge mustard in over 4%.

Of note in the survey are relatively large increases in occurrence of field pansy, tall oat grass, annual poa and prickly sow thistle. In the 1969 ranking these species were not mentioned, even in the bulk sample; between 1989 and 1990 occurrence had approximately doubled. Field pansy and nipplewort (doubling to over 5% between 1989 and 1990 in this survey) were identified in 1985 (Rolston *et al* 1985) as potential problems for seed growers; these survey results suggest that these two species are increasing, although differences in growing conditions between years may have caused the differences in incidence of contamination.

TABLE 2: Reasons for rejection from certification of cocksfoot seedlots at laboratory examination. Official Seed Testing Station.

	Seedlots rejected (%) 1989	1990
Presence of undesirable weed seeds	0	1.0
Excess other weed seeds	2.1	2.9
Total due to weeds	2.1	3.9
Total due to inert matter	2.6	2.5
Total rejections	4.7	6.4

Only sweet vernal occurrence has decreased markedly in cocksfoot seedlots. This trend has also been noticed in ryegrass seedlots (Rowarth *et al* 1990b).

In 1990, contamination by weed seeds caused 4% of cocksfoot seedlots to be rejected from certification (Table 2), that is two thirds of all rejections. In 1989, 2% of seedlots were rejected because of weeds (half of all rejections). These figures are lower than those for white clover and ryegrass (9.0%) (Rowarth *et al* 1990a and b). This reflects the fact that the New Zealand quality criteria for cocksfoot seedlines are not as strict as for other species (Table 3) because of the difficulty of removing inert material from cocksfoot seed (Table 2). (Of the lines rejected because of high inert matter content, three were over 30% inert).

The occurrence in cocksfoot seedlots of weeds designated undesirable by the New Zealand Agricultural Merchants Federation and the Official Seed Testing Station (Scott 1980; Young 1984) is shown in Table 4. The appearance of nodding thistle in a seedlot causes automatic rejection. Results from an earlier survey on nodding thistle incidence in cocksfoot suggest that contamination is not increasing (1982, 0.3%; 1976, 1.5%; 1969, 0.5%) (Young 1984).

TABLE 3: New Zealand purity standards for cocksfoot and ryegrass.

		Basic seed %	1st generation %
Cocksfoot	Minimum pure seed	90.0	85.0
	Maximum other crop seeds	0.3	3.0
	Maximum weed seeds	0.2	1.0
Ryegrass	Minimum pure seed	99.0	98.0
	Maximum other crop seeds	0.3	1.0
	Maximum weed seeds	0.2	0.5

TABLE 4: Occurrence (%) of specified undesirable weeds in officially sampled cocksfoot seedlots analysed at the Official Seed Testing Station.

Common name	Botanical name	Occurrence (%) 1989	1990
Californian thistle	*Cirsium arvense*	2.1	3.9
nodding thistle	*Carduus nutans*	0	1.0
Scotch thistle	*Cirsium vulgare*	1.6	0

Weed seed contamination has implications for internal requirements and for export potential. Several of the weed seeds commonly occurring, or designated undesirable contaminants, in cocksfoot seedlots are on the list of prohibited or restricted weeds in the seed quarantine regulations of other countries. Therefore export of contaminated lines to those countries is prevented. Australia prohibits entry of any seed containing Californian thistle or nodding thistle; the European Economic Community (EEC) will not import cocksfoot seed containing more than 10 dock seeds per 30g, more than 0.3% couch seed, or more than 1.5% other seeds; the USA prohibits entry of seed containing

Californian thistle and some states including Oregon, will not import seed containing annual poa. Thus present and future markets for cocksfoot are being threatened by weed contamination.

At present there are no chemicals with label claims for use in cocksfoot seed crops. Further research is necessary to identify chemicals which are effective against major contaminants in cocksfoot (Rolston 1991). Because many of the contaminants are also prevalent in white clover and ryegrass seed crops (Rowarth *et al* 1990a and b), success in one area may reap benefits in others.

CONCLUSIONS

Results from this survey indicate that fewer cocksfoot crops than ryegrass or white clover crops are rejected because of weed seed contamination. However, this lower rejection figure reflects lower quality standards which are not necessarily in force overseas. The export potential of cocksfoot is limited by its weed content which will, in turn, detrimentally affect the acceptance and use of New Zealand cocksfoot cultivars overseas. The full potential for expansion in overseas markets will not be reached unless New Zealand herbage seed producers keep their seed clean. In order to achieve this there is a need to develop effective weed control measures for major contaminating weeds.

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