THE HARMFUL EFFECTS OF WEEDS

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Summary

Weed problems are outlined and observations on weed species in grass, clover and lucerne crops summarized. The extent of "weed seed" impurities in commercial lines of specific seed crop species is indicated, based on examination of Purity and Germination certificates. No reference is made to "other crop" impurities except for brief reference to suckling clover (*Trifolium dubium*).

THE harmful effects of weeds and the problems they create are both numerous and diverse. Their implications certainly extend beyond the bounds of agriculture.

For weeds, or their seeds:

- ◆ Aggressively invade crops and pastures, adversely affecting establishment and/or subsequent growth, maturity, yield or harvesting, and the ultimate financial outcome of crop and herbage production and utilization.
- ◆ Impare the quality of pastoral, dairying and crop products or by-products.
- ◆ Act, as hosts, in perpetrating plant and animal diseases.
- ◆ Entail costly land development or pasture improvement techniques or impose restrictions on land utilization or farm and grazing management programmes.
- ◆ Are poisonous or otherwise injurious to stock and/or humans.
- ◆ Harbour wildlife pests and create fire hazards.
- ◆ As declared noxious weeds — and quite apart from their other ill-effects — render property owners liable to prosecution.
- ◆ Prove troublesome on roadways, paths, embankments, sports areas, industrial (and similar) sites, playing greens, lawns, gardens and waste spaces.
- ◆ Become exotic invaders of indigenous flora in nature wilderness areas — to the consternation of National Park authorities.
- ◆ As weed seed impurities of harvested seed are often difficult and costly to remove and consequently make it difficult to achieve the machine-dressed, purity standard requirements of local or export trade.

These harmful effects, not necessarily a complete list, illustrate the diverse ramifications of weeds and the problems they create. Not all these problems directly concern agriculture. Nor are they all a consequence of weed seed impurities in agricultural seeds.

In relating weed seeds to the production of and trade in pure lines of grass, clover and lucerne, the implications of the broader spheres of influence cannot be disregarded. For, even under present-day seed regulations and trade requirements, commercial lines of these seeds constitute ideal media for the widespread dissemination of weeds.

WEEDS IN SEED CROPS

Though weed seed impurities may gain entry into pure seed lines at varying stages in the processes of harvesting, cleaning, blending and packaging, they arise, basically, in the fields in which seed crops are grown and appear, initially, in the field-dressed sample.

Seeds of many species can be readily removed by modern seed-dressing plants but the presence and extent of weed species growing in seed crops are indicative of their likely occurrence as impurities, in commercial lines.

MOST WIDELY DISTRIBUTED SPECIES

Observations by advisory and seed certification officers suggest that the most widely and commonly observed weeds in grass, clover and lucerne seed crops throughout the main seed growing regions, comprise some eighteen species plus the "flatweed" complex — *i.e.*, dandelion (*Taraxacum officinale*), catsear (*Hypochaeris radicata*), hawksbeard (*Crepis capillaris*), beaked hawksbeard (*C. taraxacifolia*) and hawkbit (*Leontodon taraxacoides*).

Of the eighteen separate species, five are noxious — barley grass (*Hordeum murinum*) and Californian, Scotch, nodding and winged thistle (*Cirsium arvense*, *C. vulgare*, *Carduus nutans* and *C. tenuiflorus*). Five others — bromus mollis (*Bromus mollis*), broad-leaved and curled docks (*Rumex obtusifolius* and *R. crispus*), sheep's sorrel (*Rumex acetosella*) and suckling clover (*Trifolium dubium*) — as seed impurities, impinge on local or export seed sales and necessitate extra seed-cleaning precautions.

The remaining seven — mouse-eared chickweeds (*Cerastium glomeratum*, mainly), fathen (*Chenopodium album*), narrow-leaved plantain (*Plantago lanceolata*), shepherd's purse (*Capsella bursa-pastoris*), sweet vernal (*Anthoxanthum odoratum*), and Yorkshire fog (*Holcus lanatus*) — include persistent crop and pasture weeds like mouse-eared chickweed, fathen, shepherd's purse and Scotch thistle, or are difficult to dress out of certain seed lines.

OTHER WIDELY OBSERVED SPECIES

A further thirteen species are also widely observed and, though this group contains no noxious weeds, most are objectionable. Chickweed (*Stellaria media*), field madder (*Sherardia arvensis*), hedge mustard (*Sisymbrium officinale*), redroot (*Amaranthus* spp.), speedwell (*Veronica* spp.), spurrey (*Spergula arvensis*) and willow weed (*Polygonum persicaria*), are troublesome crop weeds that offer seed-cleaning problems, as does striated clover (*Trifolium striatum*). Wild oats (*Avena fatua* and *A. persica*) create cereal quality problems, whilst the strong-awned seeds of the storksills (*Erodium cicutarium* and *E. mochatum*) cause pelt damage. The remaining species, toad rush (*Juncus bufonius*), is probably least harmful.

LESS WIDELY OBSERVED

Thirty-nine species seem less widely observed in seed crops though fifteen are of some regional significance. This regional sub-group includes: canary grass (*Phalaris* spp.), bur and spotted bur clovers (*Medicago polymorpha* and *M. arabica*), sweet clover (*Melilotus alba*) and trigonel (*T. ornithodioides*) in Marlborough: poa trivialis (*Poa trivialis*) in Hawke's Bay: floating sweet grass (*Glyceria fluitans*) in Manawatu-Wairarapa: rough dogtail (*Cynosurus echinatus*) in Marlborough-Canterbury: creeping fog (*Holcus mollis*), forget-me-not (*Myosotis discolor*), King Island melilot (*Melilotus indica*), onion twitch (*Arrhenatherum elatius* var. *bulbosum*), ox-eye daisy (*Chrysanthemum leucanthemum*) and wild pansy (*Viola* spp.) in Canterbury and poa pratensis (*Poa pratensis*) in Canterbury-Otago.

The other twenty-four species include five noxious weeds — giant buttercup (*Ranunculus acris*), stinking mayweed (*Anthemis cotula*), slender-winged and star thistles (*Carduus pycnocephalus* and *Centaurea calcitrapa*) and wild turnip (*Brassica campestris*). Two are parasitic on legumes — i.e., broomrape (*Orobanche minor*) and clover dodder (*Cuscuta epithymum*). Cluster clover (*T. glomeratum*), haresfoot trefoil (*T. arvense*), and the lotus species are difficult to remove from white clover seed. Some are undesirable crop weeds — cornbind (*Polygonum convolvulus*), mallow (*Malva* spp.), annual nettle (*Urtica urens*), vetches (*Vicia* spp.) and yarrow (*Achillea millefolium*). Several are pasture weeds of varying import — i.e., barren brome (*Bromus sterilis*), hairy and small-flowered buttercups (*Ranunculus sardous* and *R. paviflorus*) and rushes (*Juncus* spp.). Creeping buttercup (*R. repens*), is allegedly poisonous to stock.

The remaining four species — catchfly (*Silene gallica*), dovesfoot (*Geranium molle*), parsley piert (*Aphanes* sp.) and wintercress (*Barbarea* spp.) — are not very serious weeds.

SPECIES NOT REPORTED

It is to be expected that not all weed species occurring in seed crops will be observed and reported in a general survey. Consequently, many species known to occur in seed lines were missing from the field observation reports.

Probably the most notable omissions were: the noxious weeds, Australian sedge (*Carex longibrachiata*), burdock (*Arctum* spp.), scentless chamomile (*Matricaria inodora*), field bindweed (*Convolvulus arvensis*), foxglove (*Digitalis purpurea*), hemlock (*Conium maculatum*), hoary cress (*Cardaria draba*), nassella tussock (*Nassella trichotoma*), ragwort (*Senecio jacobaea*), St John's wort (*Hypericum perforatum*) and the thistles, Grecian (*Chamaepeuce afra*), variegated (*Silybum marianum*) and welshed (*Carduus crispis*). Some of these, notably foxglove, hemlock, hoary cress, ragwort, St John's wort and variegated thistle, are widely distributed and persistent pasture weeds that, except for hoary cress, are poisonous or otherwise injurious to livestock.

Other relatively important, non-observed, species include Australian sheep's bur (*Acaena ovina*) and piri piri (*A. anserinifolia*), which, with burdock, create wool problems: needlegrass (*Stipa variabilis*), whose stout awns damage pelts: black nightshade (*Solanum nigrum*) whose "berries" affect processing crop products: bladder campion (*Silene vulgaris*), Californian stinkweed (*Navarretia squarrosa*) and couch (*Agropyron repens*) are undesirable cropping weeds: reversed clover (*Trifolium*

resupinatum) is a seed-cleaning problem and twincrest (*Coronopus didymus*) causes taint in dairy produce.

These and innumerable other weed species occasionally occur as undesirable impurities in commercial seed lines.

SPECIFIC CROP IMPURITIES

The frequency and extent to which seed crop weeds will occur as impurities in seed lines is governed by a number of factors but an examination of seed certification, Purity and Germination certificates, offers a reliable guide. With the assistance of Seed Testing Station (Central Records) staff, some 845, randomly-selected, P. & G. certificates relating to 1968 season grass, clover and lucerne lines were examined. Within the limitations of the relatively small number of samples representative of individual crops, the results indicate the following:

RYEGRASSES (Ariki, Manawa, Ruanui)

250 "field inspected" and 110 "laboratory test only" lines

The most likely impurities (in order of frequency) in "work" samples for "field inspected" (F.I.) lines are: bromus mollis, Vulpia hair grass, field madder, poa annua, shepherd's purse, mouse-eared chickweed, sheep's sorrel, sweet vernal and striated clover.

Others, often only in "bulk" samples, include: floating sweetgrass, chickweed, Yorkshire fog, speedwell, narrow-leaved plantain, small-flowered buttercup, hedge mustard, storksbill and "flatweeds".

Both F.I. and "laboratory test (L.T.) only" lines were similar for bromus mollis, hairgrass, storksbill, chickweed, Yorkshire fog, and "flatweeds", but the latter lines *more frequently* contained docks, cluster and striated clovers, sweet vernal, sheep's sorrel and winged thistle and, *less frequently*, mouse-eared chickweed and field madder, than did the samples from F.I. lines.

Commonly and widely noted field weeds, such as barley grass, docks, spurrey and Californian, Scotch and winged thistles, appeared, conspicuously, infrequently on the P. & G.s sampled.

COCKSFOOT (*Dactylis glomerata*)

50 P. & G.s

Species' order of frequency, in "work" samples were: Yorkshire fog, bromus mollis, *Rumex* spp. (mainly docks), "flatweed", sweet vernal and Vulpia hairgrass. In the "bulk" samples, bromus mollis, mouse-eared chickweed, *Rumex* spp., shepherd's purse and sweet vernal featured relatively more frequently.

Field noted species, like barley grass, field madder, hedge mustard, poa annua, striated clover and thistles, appeared infrequently, or not at all, on the sample certificates.

WHITE CLOVER (*Trifolium repens*)

100 P. & G.s of each of F.I. and L.T. only samples

The most likely frequency sequence in F.I. "work" samples is *Rumex* spp. (mainly sheep's sorrel), field madder and chickweed very prevalent, followed by fathen, narrow-leaved plantain, cluster clover and scarlet pimpernel (*Anagallis arvensis*), with these species, and to a lesser extent spurrey and sweet vernal, also featured in the "bulk" sample.

The "work" samples in the L.T. category show a very similar sequence pattern except that fathen and cluster clover are less prevalent.

Field observations reconcile with these test results, except that barley grass, docks, flatweeds, poa annua, shepherd's purse, storksbill, wireweed (*Polygonum aviculare*) and the thistles failed to materialize significantly in the P. & G. examinations.

RED CLOVERS (*Trifolium pratense*)
90 P. & G.s

Broad-leaved dock, narrow-leaved plantain, field madder and curled docks were prevalent, in that order of frequency, in "work" samples. The sequence in "bulk" samples was similar, but with the addition of striated clover, sheep's sorrel and to a lesser extent, willow weed and wireweed.

Prominent at field inspections but not recorded significantly on P. & G. certificates were: "flatweeds", fathen, poa annua and Scotch thistles.

LUCERNE (*Medicago sativa*)
15 P. & G.s

The very limited number of certificates examined suggests that docks, fathen, narrow-leaved plantain, mallow, and possibly canary grass, are most likely to be found in "work" samples.

Mallow, wireweed, striated clover, field madder and, probably, trigonel, self heal (*Prunella vulgaris*) and sheep's sorrel, may be more evident in the "bulk".

The omission of field-observed weeds such as "flatweeds", hairgrass, Scotch thistle and storksbill, are the notable discrepancies between field and station reports.

TIMOTHY (*Phleum pratense*)
15 P. & G.s

Also from limited evidence, the likely order in "work" samples may be annual mouse-eared chickweed, Yorkshire fog, sweet vernal, chickweed, docks, "flatweeds", and hedge mustard, with the inclusion of the noxious, scentless mayweed together with fathen, poa annua, spurrey and wintercress mainly in the "bulk" sample.

Narrow-leaved plantain and Scotch thistles are two species widespread in the field but not prevalent in the station report.

BROWNTOP (*Agrostis tenuis*)
40 P. & G.s

"Work" samples feature mouse-eared chickweed, toad rush, Californian thistle, "flatweeds" and tarweed (*Parentucellia viscosa*) with sweet vernal, sheep's sorrel, shepherd's purse and speedwell becoming more evident in "bulk" samples.

CHEWING'S FESCUE (*Festuca rubra* ssp. *commutata*)
25 P. & G.s

Vulpia hairgrass, "flatweeds", sweet vernal and bromus mollis are prominent in "work" samples. Sheep's sorrel, Scotch thistle and York-

shire fog are, additionally, noticeable in the "bulk" which may also contain shepherd's purse, annual mouse-eared chickweed, poa annua, and kneed foxtail (*Alopecurus geniculatus*).

CRESTED DOGSTAIL (*Cynosurus cristatus*)
50 P. & G.s

The range and frequency of prominently occurring impurities appear greater in crested dogstail than in most other seed crop species included in the survey.

Prolifically prominent in the "work" samples were: "flatweeds" (cat-ear, hawkbit and hawksbeard), poa annua, Yorkshire fog, Vulpia hairgrass, sweet vernal and kneed foxtail, whilst annual mouse-eared chickweed, plantain, sheep's sorrel, shepherd's purse, sow thistle (*Sonchus* spp.), spurrey, chickweed and bromus mollis are common if both "work" and "bulk" samples are considered.

NOXIOUS IMPURITIES

Noxious weed seeds were detected in 61 of the 845 P. & G.s examined — 15 recordings in "work" and 46 in "bulk" samples. The chief offenders were Californian thistle (7 "work": 10 "bulk"), mainly in browntop but also in crested dogstail, ryegrass, timothy and cocksfoot: winged thistle (3:10) in ryegrass and cocksfoot; nodding thistle (0:5) in ryegrass and red clover; Scotch thistle (4:10) mainly in ryegrass, Chewing's fescue and cocksfoot and scentless chamomile (1:3) in timothy and ryegrass. Barley grass and *Cardus* spp. each occurred four times in "bulk" tests of ryegrass, crested dogstail and lucerne.

Wild oat, an objectionable though not noxious weed, appeared twice in "work" and six times in "bulk" tests in ryegrass and cocksfoot.

ACKNOWLEDGEMENTS

The author is indebted to farm advisory and seed certification staff of the Farm Advisory Division and Central Records staff, Seed Testing Station, for helpful comments and data.