



*Invasion of Exotic Plants and Their Economic  
Significance in Oregon\**

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**T**HE INTRODUCTION of a foreign species, whether plant or animal, which is left to uncontrolled propagation, may lead to unexpected, even startling results. If the introduction is deliberate, it is always an experiment, often at an economic risk; more frequently it is accidental.

Among the native plant and animal populations of any territory there is commonly something approaching an ecological equilibrium. This is invariably upset by the advent of civilized man through his destruction of forests, cultivation of land, propagation of domestic species, and so forth. Almost as effective in disturbing the balance of life are the numerous species brought into the new region from remote parts of the world through the medium of commerce. Many of these species are escapes from cultivation or domestication and may become important pests. These forms that follow in the wake of civilization are for the most part vigorous, aggressive, and highly adaptive, the successful competitors among vast numbers long subjected to a struggle for existence under those special conditions of environment brought about through human agency. This is particularly true of plants, with which, in the present discussion, we are mainly concerned.

ESTABLISHING ECOLOGICAL BALANCE

FORTUNATELY, ANY DISTURBANCE of the ecological balance of species in a given locality is usually only temporary (unless the causes continue to operate

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with increasing intensity) and a new equilibrium will be established within a comparatively short time. If this were not the case, the plant population would fall into a quite chaotic state and many native forms of great value to man might be reduced to extinction, since the latter are often at great disadvantage in competition with the foreigners. Probably the main reason many exotic plants multiply so inordinately when first introduced is that in their journey to the new territory they have left behind their natural enemies, particularly predatory and parasitic organisms that formerly held them in check, so that the survival rate of their progeny becomes very high. But usually within a brief period a new line of resistance to their advancing front is established and they become the prey of a new set of enemies, both plant and animal, that may have changed their nutritional habits somewhat, enabling them to exploit a new and abundant food supply. They may thus multiply rapidly, keeping pace with the invading species, which will then begin to decline in rate of increase, and this in turn will be followed by a decrease in the enemies that have become dependent upon them, so that an approximate equilibrium will soon ensue.

These general facts must be taken into account in estimating the economic importance of introduced plants in any region. We may call to mind various foreign species that were decidedly detrimental to agriculture twenty-five years ago which may now be regarded as relatively innocuous weeds, while some of our worst plant enemies of today were at that time scarcely noticed; in another twenty-five years these may have ceased to be a serious problem. It is true that certain exotic species which probably through the centuries have become adapted, through a process of natural selection, to thrive in spite of high cultivation, defy all our efforts to eradicate them and are likely to continue to do so; such plants are weeds in the fullest sense of the term. It is worthy of note that comparatively few of our really troublesome weeds in the western United States are native species, as they frequently are in the eastern states. This is probably because time is required for the selective process to yield results.

#### WEED DOMINANTS LOCALIZED

IN EXAMINING THE WEED FLORA of Oregon we find an essentially different set of species dominating each of the major soil and climatic areas of the state. Thus, considering only exotic forms, three annual brome-grasses form a high percentage of the total vegetation over a very large part of the region east of the Cas-

cedes. By far the most abundant and widely dispersed of these is *Bromus tectorum*. Here also we find an immense abundance of certain weedy Cruciferae, *Sisymbrium altissimum*, *Lepidium perforatum*, and the more recently established but rapidly spreading *Erysimum repandum*. Other Cruciferae abound locally, such as *Lepidium campestre* and *Thlaspi arvense* in the Grand Ronde Valley. *Bassia byssopifolia*, of the Chenopodiaceae, has taken possession of large areas in Umatilla County and is rapidly extending its range. In southern Oregon, in the high hills east of Ashland, thousands of acres are covered, almost to the submergence of other forms of herbaceous vegetation, with a continuous mantle of *Elymus caput-medusae*, the Medusa-head grass. Such a list might be indefinitely extended. Only one or two of the above named plants are weed-pests in any part of the Willamette Valley, and several are rare or absent.

The total number of species of foreign plants that may fairly be considered as established and naturalized in Oregon and at present forming an integral part of our wild flora, is about 325; the number may be somewhat higher. Of these, some 215 occur in the Willamette Valley. Probably the reason for the high percentage in this area is the close similarity of the climate to that of northwestern Europe, which has furnished a great preponderance of the weed flora of the northern United States, especially in the areas of abundant moisture; the Mediterranean region has contributed numerous forms to the drier sections.

#### EXOTIC PLANTS OF THE WILLAMETTE VALLEY

LET US NOW CONSIDER a little more in detail the foreign-plant population of the Willamette Valley. Of the 215 mentioned, ten are shrubs or small trees, the rest being annual or perennial herbs. On the basis of habitat we may divide the exotics into several categories. The most natural grouping seems to be (1) lawn species, (2) garden and field species, (3) pasture species, and (4) waste-ground species. These categories, of course, are not very sharply defined. Certain species are abundant in all four of the habitats, others nearly equally common in two or three. In assigning many species to their respective groups, we have naturally been influenced somewhat by economic considerations. Thus the smooth hawkbeard, *Crepis capillaris*, is very abundant in waste ground and fields as well as in lawns, but is more troublesome in the latter situation and so is placed in that category.

In the lawn group we have included twenty-five species. About one half of

these are too scarce, for the most part, to be of much significance. The more abundant are the following: orchard grass, *Dactylis glomerata*; English rye grass, *Lolium perenne*; common mouse-ear, *Cerastium vulgatum*; small-flowered geranium, *Geranium pusillum*; least hop-clover, *Trifolium dubium*; English plantain, *Plantago lanceolata*; blue field madder, *Sherardia arvensis*; English daisy, *Bellis perennis*; gosmore, *Hypochaeris radicata*; dandelion, *Taraxacum officinale*; smooth hawksbeard, *Crepis capillaris*.

Of the garden and field species (those able to thrive under intensive cultivation), we have listed thirty-six. The following are abundant and in many cases very troublesome weeds: Canada bluegrass, *Poa compressa*; Kentucky bluegrass, *Poa pratensis*; slender wild oats, *Avena barbata*; red sorrel, *Rumex acetosella*; pigweed, *Chenopodium album*; pigweed amaranth, *Amaranthus retroflexus*; shepherd's purse, *Bursa bursa-pastoris*; rutabaga (the common mustard), *Brassica campestris*; radish, *Raphanus sativus*; hedge mustard, *Sisymbrium officinale*; carrot, *Daucus carota*; field morning-glory, *Convolvulus arvensis*; dog fennel, *Anthemis cotula*; common groundsel, *Senecio vulgaris*; Chile tarweed, *Madia sativa*; ox-eyed daisy, *Chrysanthemum leucanthemum*; bachelor's buttons, *Centaurea cyanus*; Canada thistle, *Cirsium arvense*; wild lettuce, *Lactuca scariola*.

The pasture group comprises an ill-defined assortment of some twenty-seven species, as we have listed them, and grades imperceptably into the waste-ground assemblage. The following are among the most abundant: sweetbriar rose, *Rosa rubiginosa*; evergreen blackberry, *Rubus laciniatus*; common St. Johnswort, *Hypericum perforatum*; teasel, *Dipsacus sylvestris*; common thistle, *Cirsium lanceolatum*; and various others included in one of the other categories, such as red sorrel, dandelion, gosmore, and smooth hawksbeard. Those having distinct forage value are here omitted.

By far the longest list comprises what we have called the waste-ground species. There are about 125 of these. They are plants usually found flourishing on vacant city lots, along roadsides, in abandoned fields and poorly cultivated orchards. Many spring up in great abundance after fall plowing but are largely destroyed by cultivation. Such areas form excellent starting places for newly introduced species, from which, if sufficiently hardy and aggressive, they may spread to fields, lawns, and pastures. Many waste-ground species have a very local or sporadic distribution. In the course of a few years some may quite disappear from our flora; others may become abundant and troublesome

weeds. Their present status is that of merely minor nuisances, though some have a certain ornamental value.

A considerable number of our abundant naturalized exotics have a distinct economic value. We have listed thirty-three of these. Most of them are grasses and leguminous species that have escaped from cultivation. A few of these have been included among the field and garden and lawn weeds. For example, *Poa pratensis*, *Lolium perenne*, and *Avena barbata*.

In conclusion, it may safely be said that while our wild flora has in some particulars been enriched by the incorporation of naturalized exotics, their total elimination would be to our very great advantage.