

# 1. The Nature and Importance of Weeds

## WHAT IS A WEED?

**I**N GENERAL TERMS a weed is any plant growing where it is not wanted, particularly where man is attempting to grow something else. Corn or sweet clover may be considered weeds if they volunteer along a highway shoulder, yet they are important crop plants. Bermuda grass is a valuable lawn grass in the south, yet it is a noxious weed in cultivated fields. Whether a plant is a weed or not may depend on where it is encountered. There are, however, many plants which usually grow where they are not wanted, have no economic value, and usually interfere with the production of cultivated crops or with the welfare of livestock. These plants are nearly always considered to be weeds.

## WHERE DID WEEDS COME FROM?

A hundred and fifty years ago the central United States was largely a vast expanse of grassland and, in certain areas, forests. The land was covered with a stable and relatively continuous series of vegetational communities. There was very little unoccupied or open soil. And there were very few of the plants which we now call weeds.

Before the initiation of agriculture by man (which possibly dates back not much more than 10,000 years), there was little place for weedy plant species. Weeds are essentially plants of disturbed areas — broken, open soil. Before man's agriculture, such areas probably made up only a small proportion of the earth's surface. They existed primarily along animal paths, around the encampments of early man, and along the edges of streams. Weeds were, in essence, unsuccessful plants in the struggle for existence.

Man's agriculture changed everything. It altered the face of the earth more drastically and quickly (geologically speaking) than any catastrophe of past ages. Plants (and animals) adapted to dominate the living world, abruptly found themselves on the edge of extinction. On the contrary, certain plants, previously barely able to exist, found vast new habitats opened up to them. As they spread and multiplied, those with the greatest potential genetic variability responded in the

evolutionary sense by developing numerous forms and physiological races allowing them to take advantage of the many facets of the new environment. These plants were, and are, our weeds.

Weeds come from all corners of the earth. However, the preponderance of weedy species are native to the Eurasian continent. They spread over the Old World with man and his advancing agriculture. They were not present in the American hemisphere until the coming of the white man. Weeds of pre-Columbian Indian agriculture were entirely of American origin. Our present weeds are of both kinds, but with the Old World types predominating.

The above discussion points up another fact: That while weeds as well as other plants have natural means of dispersal (wind, water, birds carrying seed, etc.), man is by far the most important agency in their distribution. Man has taken them with his agricultural seed, his feeds, implements, etc., essentially to all major areas where adapted. He is still dispersing them within those areas.

Weeds are, then, one of the by-products of man's ascendancy. In many parts of the world they constitute, together with cultivated plants, the principal vegetation of the land. The so-called natural plant world — and this is very true in the north central United States — is rapidly becoming a memory of the past.

### IMPORTANCE OF WEEDS

Economic losses due to weeds have been said to be as great as those caused by insect injury to crops and plant diseases combined. Such losses, however, are not nearly as striking as those due to disease and insect outbreaks and are too often taken for granted.

Weeds, through their competitive effects, reduce crop yield. This perhaps is their most significant contribution to reduction of agricultural income. But weeds affect human beings and their agriculture in further ways. Control measures whereby weeds are maintained at "moderate" infestation levels cost millions of dollars every year. Crop cultivation, which constitutes a major part of farm work, is regarded as a routine operation, yet much cultivation would be unnecessary were it not for weeds. Chemical control methods, now in rapid ascendancy, are, likewise, often expensive.

Aside from effects on total yield, weeds reduce the quality and value of agricultural products, e.g. hay. Weeds serve as important hosts for insect and disease pests, thereby accentuating crop losses from these sources. Certain weeds are poisonous to man and animals, cause hay fever, etc. The miscellaneous implications of weeds are manifold: they occupy industrial sites; brushy weeds interfere with rural telephone and power lines; they obstruct vision on secondary roads; they may render waste areas, roadsides, lawns, and parks unsightly.

This topic would not be complete without pointing up some of the beneficial effects of weeds. In certain areas such as abandoned

farmland, waste areas, and some roadsides, "weeds" constitute the only major vegetation. Their value in preventing wind and water erosion and in serving as pioneer plants until a more permanent vegetation develops is not generally appreciated. Weeds furnish cover and food for wildlife. Some are excellent sources of honey. Many are highly attractive plants, and, in non-agricultural areas, along with wild flowers and trees, contribute much to the variety and attractiveness of the outdoors.

In some of the above situations, although the plants involved may be weedy species, they cannot properly be considered weeds. In such roles, these species are desirable or beneficial plants and should be recognized as such.

### CHARACTERISTICS OF WEEDS

The prime characteristic possessed by all important weeds is their ability to thrive in land subject to the plow. This characteristic is one not possessed by the majority of plant species. For example, once the prairie vegetation of the central United States was turned over, most of the plants never came back. Many weeds, it is true, will disappear under conditions of continuous cultivation, but if this cultivation is halted for a few years they will reinvade the site (or emerge from seeds already in the soil). This, most non-weedy species cannot do.

Weeds in general usually possess a number of specific attributes which render their success in disturbed areas possible and contribute to their ability to persist in spite of man's efforts to the contrary. Some of these are:

#### Perennial Underground Roots or Stems

Weeds possessing these structures will persist from year to year even though seed production is prevented. The underground parts of some weeds will spread rapidly in all directions, sending up aerial stem buds at regular intervals. Such weeds may not only persist, but their spread will actually be favored by cultivation. For instance, small fragments of the creeping roots of Canadian thistle (*Cirsium*) are capable of initiating new plants. Cultivation procedures may spread pieces of roots from a limited patch over much of a field, thus greatly augmenting the infestation.

#### Abundant Seed Production

Many weeds are capable of producing literally thousands of seeds. Examples: pigweed (*Amaranthus*); tumble mustard (*Sisymbrium*).

### Seeds Very Long-Lived

Seeds of many weeds may retain their viability in the soil for 10-50 years. Weeds of this type include butterprint (*Abutilon*); purslane (*Portulaca*); pigweed (*Amaranthus*); dock (*Rumex*); evening primrose (*Oenothera*).

### Rapid Growth

Weeds are frequently capable of growing to maturity and setting seed within a very short period of time (30-60 days). Commonly, seeds are formed before adequate control measures can be taken. Examples: foxtail (*Setaria*); pigweed (*Amaranthus*).

### Competitive Ability

Many weeds can overtake and retard crop plants even though the latter have had a head start. Thus they are often successful in out-competing crops for light. Furthermore, studies have shown that certain weeds have requirements for mineral nutrients and water which considerably exceed those of many cultivated plants.

### Unpalatability to Livestock

Frequently weeds which are successful in pastures are distasteful or poisonous to animals, or are protected by spines or similar structures. They are thus free to reproduce and spread unimpeded by normal grazing. Examples: bull thistle (*Cirsium*); mullein (*Verbascum*).

## GROWTH HABITS OF WEEDS

The above-ground parts of weeds may be woody or herbaceous. Woody plants are perennials; the stems as well as the roots live from season to season. The tops of herbaceous plants (whether annual or perennial), on the other hand, die each year and do not develop woody tissues. The majority of plants ordinarily considered weeds are herbs.

Weeds may be erect, prostrate, or grow with a vine-like habit. Ordinarily the stem bears leaves, but in a few (e.g. dandelion, *Taraxacum*; plantain, *Plantago*), the leaves are all in a cluster at ground level.

The growth habits and reproduction of herbaceous weeds is closely correlated with their duration. Annuals complete their life cycle within a single growing season. They germinate in the spring or summer, produce seed, and die the same year. The seeds of winter annuals

germinate in the fall of one growing season, live over winter, produce seed, and die the next spring. Some species may behave either as annuals or winter annuals. Biennials live two years. Usually they develop only a basal cluster (rosette) of leaves and an overwintering storage root the first season. A leafy stem, flowers, and seed emerge the second season. The plant then dies. Perennials are capable of living more or less indefinitely. The tops die back each year, but underground structures, stems or roots, live over the winter. New stems and leaves then develop the subsequent season.