WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIUOS WEED CONTROL BOARD
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Scientific Name: *Convolvulus arvensis* L.

Common Name: field bindweed

Family: Convolvulaceae

Legal Status: Class C

Description and Variation: Field bindweed is a perennial, viny, weak-stemmed herb. The root system and rhizomes are extensive, whitish and fleshy. The leaves are alternate, simple, glabrous to finely pubescent and triangular shaped with deep basal lobes. The mature plant is prostrate with slender stems that grow up to five feet or more in length. The flowers have a funnel shape and are white to light pink in color. The leaves vary greatly in size and shape due to environmental factors. Differences in susceptibility to 2,4-D have been found in populations in Washington.

Economic Importance:
Detrimental: Infestations can severely reduce crop yields. It is a poor competitor for light but an effective competitor for soil moisture. It interferes with harvesting operations due to its twining growth habit and often causes lodging of the crop. It is an alternate host of the viruses that cause potato X disease, tobacco streak, tomato spotted wilt and vaccinium false bottom.

Beneficial: Occasionally grown as an ornamental in the Mediterranean region. It is reported to be a good fodder plant for cattle. In India it is used as a purgative. It also can cause mild distress in hogs.

Habitat: (a) Climatic requirements – Distributed from latitude 60 degrees N to 45 degrees S. It is found in temperate, tropical and Mediterranean climates. It is uncommonly found in areas where there are fewer than 3,000 growing degree days above 5 degrees C. (b) Substratum – Can survive on a variety of soil types. It is found on dry or moderately moist soils and is not normally a weed of wetlands. (c) Communities in which the species survives – Found in cultivated fields, pastures, gardens, lawns, waste places and along roadways. It is a weed in over 32 different crops.

Geographic Distribution: Native to Eurasia. In the United States it is common everywhere except in the extreme southeast and parts of southern Texas, New Mexico and Arizona. It is common throughout most of Canada, Europe, Western Asia and in parts of Africa, South America, Southeast Asia, Australia and the Pacific Islands.

History: It was introduced to North America around 1739 in the state of Virginia. It spread westward rapidly with the building of railroads. By 1900, all western states were infested.

Growth and Development: Perennial. The primary root is a taproot from which lateral roots develop adventitiously. Each year most of the lateral roots die back but a few persist for several years. Buds arise on the lateral roots which develop into rhizomes that upon reaching the soil surface establish new crowns. The taproot may extend 0.5 to 3 m in length, and the entire root system may cover an area up to 6 m in diameter and 9 m in development. The rough texture of the stem and leaves makes the plant

difficult to wet with herbicidal sprays. Field bindweed overwinters by means of its roots, rhizomes and seeds. The roots are killed back to the crown by frost, but the hardened roots will withstand temperatures as low as –6 degrees C. The number of shoots formed from the lateral root segments is greatest in the early spring and least in late summer. Root regeneration may be primarily from vertical roots and rhizomes due to the limited regeneration of roots from lateral root segments. The greatest accumulation of starch in the roots occurs in August or September and it rapidly declines as it is converted to sugar. Seeds given enough moisture will germinate throughout the year, but most germination occurs in the late spring or early summer. By six weeks after emergence, the taproot is about 45-62 cm long and has developed 3 to 6 lateral roots. Each lateral root grows radially for 35-100 cm and then turns downward to become a secondary vertical root. Rhizomes develop from root buds at the bend, grow vertically, and emerge as shoots. The above-ground shoots branch into vines. Plants seldom set seed the first year. Frost kills the shoots back to the crown in autumn. In the second and subsequent years, new growth arises from endogenous root buds formed in the fall on the vertical roots and on any lateral roots that survive winter.

Reproduction: (a) Floral biology – flowers are self-incompatible and are pollinated by insects. (b) Seed Production and Dispersal – seed set is variable. Dry, sunny weather and dry, calcerous habitats are most favorable to seed set. It may fail altogether in rainy periods and on poorly drained soils. Under favorable conditions, a plant may produce between 25-300 seeds. In a pure stand, between 50,000 to 20 million seeds per hectare may be produced. Dispersal can be by animals after ingestion, by water, and as a contaminate in crop seeds. (c) Viability of seeds and germination – in lots of freshly harvested seed, the mean percentage germination varies from 5-25%, of impermeable seeds from 60-80%, and of viable seeds from 87-99%. Seeds stored at room temperatures for fifty years have exhibited 62% viability.

Seeds are usually responsible for the introduction of field bindweed to a new area. The lateral roots and rhizomes are the primary cause of spreading an infestation locally. In one Canadian study it was found that 25 shoots had emerged from a 5 cm root fragment that had been planted four months earlier. The nearest shoot was 45 cm from the parent plant and the furthest 1.3 m from the parent. After 15 months the lateral spread was 2.85 m from the parent plant. The ability of field bindweed to compete is due largely to its extensive root system. One plant is able to reduce the available soil moisture in the top 60 cm of soil below the wilting point. Winter wheat does well in competition with field bindweed because of its rapid early spring growth when bindweed is not using soil moisture.

Response to Herbicide: Herbicides commonly recommended for the control of bindweed are 2,4-D, dicamba, and glyphosate applied postemergence, alone or in combination. Wetting agents are usually added to increase coverage and absorption. Lab studies have shown that the addition of growth regulators, e.g. ethephon (1.0 kg/ha), increased the penetration and translocation of 2.4-D (0.6 kg/ha). It has been found that populations of bindweed from Washington and British Columbia show differences in their susceptibility to 2,4-D. These differences did not correspond to morphological characteristics but rather to differential binding to 2.4-D within the cells. Refer to the annually updated Pacific Northwest Weed Control Handbook.

Response to Cultural Methods: The most effective program for control of the bindweed combines cultivation and the use of herbicides. From 1-5 years of repeated tillage may be required to exhaust root carbohydrate reserves. Competitive crops such as winter wheat or perennial forages are able to reduce infestations significantly after 3-5 years, particularly when combined with herbicide use.

Response to Mechanical Methods:

Biocontrol Potentials: Insects and other non-domestic animals. Insecta Coleoptera: *Chelymorpha cassidea* Fabr. –(Argus Tortoise beetle). Both larvae and adults can defoliate *C. arvensis* completely – native to North America. *Galeruca rufa* Germar – Chrysomelid native to southern Europe that severely defoliates field bindweed – is also a potential biocontrol agent. Many other insects have been collected from *C. arvensis* in North America, but most are general phytophages and not specific.

References:

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