Chemical Composition of Weeds and Accompanying Crop Plants

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Weed control is one of the most important and expensive operations in crop production. Basic information about weeds is important to the research worker as well as to the practical farmer.

On arable land as well as on grassland, weeds are found growing with cultural plants. Often weeds constitute 30–50% of the total dry matter production. Therefore, the competition between these two groups of plants for light, moisture, and nutrients must be very strong.

The study of nutrient requirements of various weeds species and their relative importance as serious competitors for essential nutrients with their companion crop plants is a field that has been long neglected. Only a few references occur in the literature dealing specifically with weeds as important competitors for plant nutrients. The principal objective of this study was to determine the chemical composition of field-collected weed species and also their companion cultural plants. The plant nutrients studied were nitrogen, phosphorus, potassium, calcium, and magnesium. Weeds commonly found in grassland, onion, corn, and potato fields were included in the investigation.

Lucas, Scarseth, and Sieling (10) presented analytical data indicating that the uptake of potassium by weeds was greater than that for red clover. Recently Bear et al. (2), investigating nutrient requirements of alfalfa, found that where the available soil potassium was low, crabgrass (Digitaria spp.) and other weeds contained much larger percentages of K than the alfalfa that was growing on the same plots. Blaser et al. (3) found that weeds in a grass-legume mixture contained more K than the grasses, and the grasses in turn contained more K than the legumes. These relationships were consistent for all treatments and for all the seasonal harvests. However, since we do not know the exact botanical composition of the species, it is highly doubtful that we are justified in attributing these properties to all the species that may be found in grass-legume mixtures. Kling, in Germany, quoted by Korsmo (9), reported the following mineral composition of weeds on a dry-matter basis: nitrogen, 2.77–4.45%; phosphoric oxide, 0.5–2.01%; potassium, 4.91–11.98%. Korsmo (9) also reported a very high concentration of plant nutrients for weeds in Norway. Klapp (8), in Germany, found in general that grassland weeds accumulate more P, K, Ca, and Mg than their associated grasses or legumes.

MATERIALS AND METHODS

The chemical composition of weeds commonly found on arable land, onion, corn, and potato fields were studied during 1950 and 1951. The samples were collected from typical fields in an intensive agricultural area of the Connecticut River Valley in Massachusetts. The sampling area was usually 100 square feet in size, selected from a section of uniform stand of cultural plants and weeds. In grasslands, the weeds were scattered, and the collector was forced to use larger sampling areas. Fields were chosen in which the crop plants as well as the weeds were in the same stage of growth or maturity.

Grassland samples were collected before mowing in June 8–12, before bulb formation, and again September 10–15. Fields with more weeds than average were chosen for sampling since the main time of collecting the samples was to find as many weeds as possible. Although the samples were collected from fields both times, they cannot be considered entirely comparable because it was not always possible to find enough plants on exactly the same spot the second time. This also applies to corn and potato sampling also.

Onion field samples were collected during June 8–12, before bulb formation, and again September 10–15. Fields with more weeds than average were chosen for sampling since the main time of collecting the samples was to find as many weeds as possible. Although the samples were collected from fields both times, they cannot be considered entirely comparable because it was not always possible to find enough plants on exactly the same spot the second time. This also applies to corn and potato sampling also.

Corn was also sampled twice: July 10–15, when the plants were 30 inches in height and September 10–12, when the plants were in the young growth stage, only a few weed speices were present. The samples were collected at the beginning of September. The weeds were dug with most of them having about 50% mature seed and tops were sampled.

The following is a list of weed species collected for investigation. The nomenclature is that of Gray’s Manual. Common names were selected arbitrarily.

Grassland Weeds

1. Tufted vetch—Vicia Cracca
2. Yarrow—Achillea Millefolium
3. Ox-eye daisy—Chrysanthemum Leucanthemum
4. Daisy fleabane—Erigeron strigosus
5. Common dandelion—Taraxacum officinale
6. Yellow rocket—Barbara vulgaris
7. Plantain—Plantago major
8. Narrow leaf plantain—Plantago lanceolata
9. Yellow dock—Rumex crispus
10. Tall buttercup—Ranunculus acris
11. Mouse-ear chickweed—Cerastium vulgare
12. Wild carrot—Daucus carota
13. Cinquefoil—Potentilla recta
14. Common milkweed—Asclepias syriaca
15. Ragweed—Ambrosia arteniciifolia
16. Sensitive fern—Ouoclea sensibilis
17. Quackgrass—Agropyron repens

Cultivated Land Weeds

1. Pigweed—Amaranthus retroflexus
2. Ricegrass—Oryza sativa
3. Foxtail—Setaria viridis
4. Ryegrass—Lolium multiflorum
5. Sorghum—Sorghum bicolor
6. Weed sunflower—Helianthus annuus
7. Sunflower—Helianthus annuus
8. Weeds—Weeds
9. Weeds—Weeds
10. Weeds—Weeds
11. Weeds—Weeds
12. Weeds—Weeds
13. Weeds—Weeds
14. Weeds—Weeds
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