

WEED SCIENCE COMPONENT

Introduction

- The study of weeds and their management is a challenging and demanding task that requires diverse abilities.
- The term weed is an **anthropocentric** construct – meaning it is a human colored definition.
- This component endeavors to give a diligent student some insights into the general principles of weeds and their management

Outline

1. Weed biology

- Definitions
- Characteristics
- Classification

2. Crop losses due to weeds

3. Weed control methods

- Preventive
- Cultural
- Biological
- Chemical
- Integrated

4. Herbicides

Assessment

Continuous assessment

Quizzes, assignments,
practicals and a test

Final examination.

Reference books

Vernon, R. 1983. Field guide
to important weeds in
Zambia

Definitions

- Because of the importance of weeds to agriculture and their probable roles in plant domestication, it is important that we have clearly in mind what is meant or implied by the term 'weed'.
- Some of the current definitions used in agronomic instruction such as '*a weed is a plant that does more harm than good*' are clearly inadequate.
- A weed is much more than that and the implication of the term has changed over years.

- The traditional use of the word is well expressed in the Oxford English dictionary.
- *“A herbaceous plant, not valued for use or beauty, growing wild and rank, and regarded as cumbering the ground or hindering the growth of superior vegetation”.*
- It has become clear that identifying weeds by value judgment is unsatisfactory.
- A weed is a weed because of what it is and does and not simply because it is an object of prejudice.

Table 1: Weed definitions

| Source | Date | Definition |
|------------|------|---|
| Blatchley | 1912 | A plant out of place or where it is not wanted |
| Barker | 1965 | A plant whose populations, in a given geographical area grow entirely or predominantly in situations markedly disturbed by man (without being deliberately cultivated). |
| Georgia | 1914 | A plant that is growing where it is desired that something else should grow. |
| Muenschler | 1946 | Those plants with harmful or objectionable habits or characteristics which grow where they are not wanted, usually in places where it is desired that something else should grow. |
| Thomas | 1956 | A useless, undesirable and often unsightly plant of wild growth, usually found on land which has been cultivated or in areas developed by man for specific purposes other than cultivation. |

| Source | Date | Definition |
|-------------------|-------------|--|
| Wodehouse | 1960 | An unwanted plant. |
| Harlan and De Wet | 1965 | A generally unwanted organism that thrives in habitats disturbed by man. |
| Emerson | 1912 | A plant whose virtues have not yet been discovered. |
| King | 1951 | Weeds are plants that have been condemned without a fair trial. |
| Bunting | 1960 | Weeds are pioneers of secondary succession of which the weedy arable field is a special case. |
| Dayton | 1950 | Introduced plant species that take possession of cultivated or fallow fields. |
| Harper | 1944 | Introduced plant species that take possession of cultivated or fallow fields and pastures. |
| Pritchard | 1960 | Opportunistic species that follow human disturbance of the habitat. |
| Aldrich | 1984 | A plant that originates under a natural environment and in response to imposed and natural environments, evolved and continues to do so as an interfering associate of our crops and our activities. |

- We can see that there are so many definitions of weeds from different perspectives:
 - Agronomists
 - Ecologists
 - Enthusiastic amateurs
- For a weed scientist however, a plant is a weed because it occurs spontaneously in human disturbed habitat AND in some way interferes with human welfare and or activities.

Characteristics of weeds

- There are some characteristics that are collectively shared by non-crop plants which make them weeds.
- Some features however, set a plant apart as a weed from a crop.
- We therefore differentiate between individual and collective characteristics of weeds.

**INDIVIDUAL
CHARACTERISTICS OF
WEEDS**

Harmful to humans, animals and crops

- Weeds with this characteristic may contain poisonous alkaloids (e.g. pods of *Mucuna pruriens*).
- High levels of nitrates (e.g. *Amaranthus* spp.).
- Parasitic on crops (e.g. *Striga asiatica*).



Wild and rank growth

- Weeds that possess these features are usually of large size.
- They tend to grow rapidly, branch or tiller profusely and cover extensive areas.
- E.g. *Rottboellia conchinchinensis*, *Chromolaena odorata*, *Andropogon* spp.



Persistent and resistance to control

- Weeds that possess these characteristics have diverse forms of propagules such as seeds and vegetative propagules.
- Examples, *Cyperus rotundus* and *Cyperus esculentus* which combine a well developed tuber system with moderate production of viable seeds.



High reproductive capacity

Many annual weeds have the ability to produce large quantities of seeds.

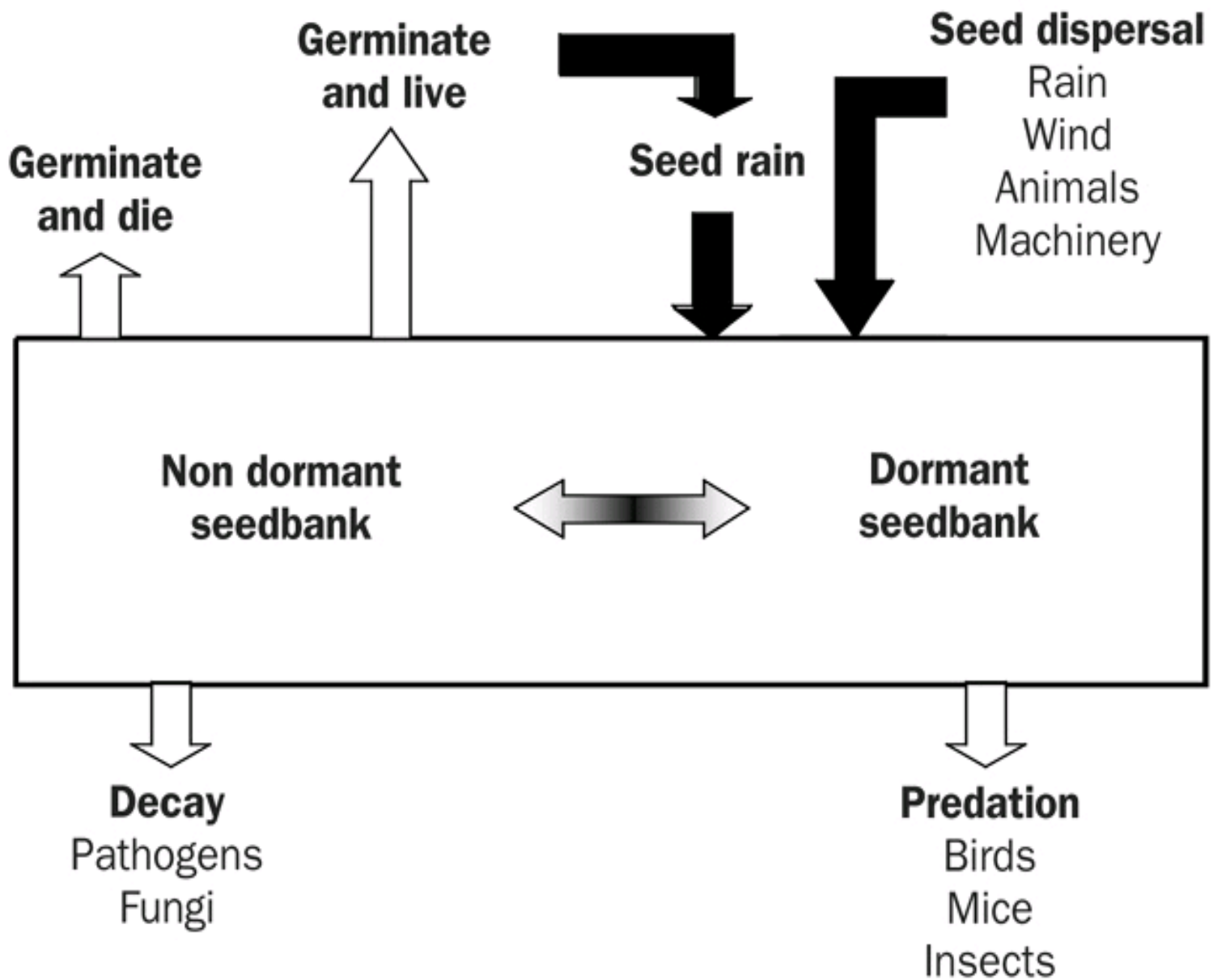
Table 2: Seed production in selected tropical weeds.

| Species | Seeds per plant |
|-------------------------------|------------------------|
| <i>Ageratum conyzoides</i> | 40,000 |
| <i>Amaranthus spinosus</i> | 235,000 |
| <i>Bidens pilosa</i> | 5,000 |
| <i>Digitaria horizontalis</i> | 12,000 |
| <i>Echinochloa colonum</i> | 42,000 |
| <i>Eluesine indica</i> | 135,000 |
| <i>Striga asiatica</i> | 90,000 |



Seed dormancy

- A condition in which a seed fails to germinate in the presence of environmental conditions that are normally favorable for seed germination.
- Seeds of many weed species exhibit varying forms of dormancy.
- It is a survival mechanism



- **The density and composition of this seed bank depends on the history of land use and disturbance frequency of the land.**
- **The proportion of viable seeds in the bank decreases with increased disturbance because there is increased seed predation, decreased seed input and increased seed mortality.**

COLLECTIVE PLANT CHARACTERISTICS OF WEEDS

May grow in an undesirable location

- This ability to grow in an undesirable location is a major attribute of most weeds.
- Consequently, weeds are found not only in cultivated fields, but also in playing fields and other recreational sites.
- Also grow through cracks in concrete and asphalt pavements.

May have large populations

- Weeds that possess this characteristic tend to grow densely around economic plants.
- Such weeds are adapted to overcrowding.
- Many annual weeds consist of large populations.
- Examples, *Euphorbia heterophylla*, *Ageratum conyzoides*, *Bidens pilosa*.
- These weeds outcompete crops because of numerical superiority.

Spontaneous growth

- This characteristic is common among most annual weeds with very small and obscure seeds that are buried in the soil like
 - *Amaranthus spinosus*
 - *Striga asiatica*
 - *Talinum triangulare*

Aggressiveness

- Many weeds that are aggressive have rapid seedling growth and wide tolerance to both edaphic and environmental factors.
- Many are deep rooted
- Others have intraspecific variation while others exhibit great plasticity of growth.
- E.g. *Euphorbia heterophylla*

