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Algae Identification

FIELD GUIDE

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Algae Identification **Field Guide**

AN ILLUSTRATIVE FIELD GUIDE ON IDENTIFYING COMMON ALGAE FOUND IN THE CANADIAN PRAIRIES

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Foreword

The algae identification field guide and accompanying lab reference manual were created for agricultural field personnel interested in algae, such as agricultural extension staff, watershed groups and individuals who work with agricultural surface water supplies. Algae listed in this guide and manual are not organized according to their evolutionary relationship (i.e. taxonomically) as with most traditional classification keys, but are presented based on common situations or issues that are significant to our target audience. Algae are also classified into four main groups (Palmer 1962): Blue-Greens, Greens, Diatoms and Flagellates. Information on these algal groups are found in the Algae Identification Lab Guide.

The objective of the guide and manual is to provide a starting point in identifying the most common or easily identifiable algal genera typically found in lakes, dugouts, wetlands and other freshwater lentic systems that are significant to our target audience. This starting point for algae identification is outlined as a two-step approach:

A. In the field, where depending on the situation, using the three senses of sight, smell and touch will help give the user a primary assessment of which algal group or genera the algae might belong to; and

B. In the lab, where the identification of algae is validated using a compound microscope. Since there exists many diverse species within each genus of algae and many looking very similar macroscopically, verification of algae must be done using a microscope.

Provided is a two part document on algae identification: the Algae Identification Field Guide (Part A) and Algae Identification Lab Reference Manual (Part B). As well, the field guide is available as a program tool compatible with ESRI's GIS program ArcPAD, and is found attached to this guide as a CD-ROM. This program tool improves the efficiency of algae identification and data collection than can otherwise be done with paper-based field guides and data collection forms, as well as provides a way in which each sample can be plotted spatially for future reference.

Table of Contents

Introduction

What are algae?

They are organisms with a mixed evolutionary history that have four main commonalities:

1. They are very simple organisms with no vascular tissue. The only exception are brown algae where they have a higher degree of organ differentiation.
2. They have naked reproductive structures, i.e. there is no protective layer of cells around reproductive structures.
3. They are photoautotrophic, i.e. they produce their own food materials through photo synthesis by using sunlight, water and CO_2. There are some exceptions, such as some species of *Euglena*, where they ingest other organisms for food because they do not have any chloroplasts.
4. Similar to plants, they contain chlorophyll. However, not all algae are classified as plants.

Where are they found?

Algae commonly grow in any habitat where water or moisture is found. Habitats include fresh and salt water bodies, hot springs, ice, air, and in or on other organisms and substrate. In the Canadian Prairies, they are more common in summer than winter.

They are also found in communities, living with many other different species of algae, plankton and zooplankton. These communities can tell you a lot about the health of the ecosystem. For example, a community of *Euglena, Scenedesmus* and *Selenastrum* likely indicates a eutrophic water body.

Why study algae?

Algae are important indicators of ecosystem health and integrity because they form the base of most aquatic food chains. Virtually all aquatic animals are dependent on this primary producer. Algae are also an excellent indicator of water quality, as their abundance and community composition most often reflects (and has the capacity to affect) the chemical properties of water such as pH and nutrient levels.

Their ability to grow in large quantities can lead to dramatic changes in the appearance, taste and odour of water, and can negatively affect organisms in higher trophic levels (e.g. fish kills). Algae also can interfere with general water use and distribution, impairing water pumps, filters, pipes, animal troughs and misters, boilers and cooling equipment. For prairie water sources, algae can pose unique challenges for a variety of water uses because of the common and prolific growth cycles of algae during the open water season.

Knowledge about algae can provide valuable insights into water quality, indicating concerns such as pollution to waterways, reduction in water flow, or a health and safety risk, as some algal species are highly toxic to humans and livestock. Of significant concern for water users is Cyanobacteria (sometimes referred to as “blue-green algae”). Cyanobacteria is actually a bacteria that may produce lethal neurotoxins (brain toxin) or hepatotoxins (liver toxin), which can cause serious illness or death in humans and animals if the toxins are ingested.

It is important to note that while algae tend to be the most notable problem or issue in an aquatic ecosystem, other planktonic biota or organisms, including zooplankton and macro-organisms (both plants and animals), can also affect the physical, chemical and biotic properties of a water body. These factors should be taken into account when studying the aquatic ecosystem as a whole.

The starting point

1

Step One.

Which type of situation are you dealing with?

A. A surface water bloom
Go to page 12

B. Algae interfering with coagulation
Go to page 26

C. Attached algae and algae mats found near shore
Go to page 28

D. Potentially threatening freshwater algae
Go to page 30

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Step Two.

Once you have matched your alga to a close description, there is a page number beside the algal name. This page number is makes reference to the *Algae Identification Lab Guide* where you can find more information about the alga and its characteristics under the microscope. For example, "*Cladophora*, pg 28" indicates that your alga may be from the genus *Cladophora* and "pg 28" refers you to page 28 of the *Algae Identification Lab Guide* where you can find more information about this genus.

If you can not successfully match your alga to any of the algae descriptions, it is likely that your alga may not be listed in this guide.

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Step Three.

To validate your algae identification, collect a sample that can be brought back to the lab and examined under a compound microscope.

Legend

- **BG** — Blue Green (cyanobacteria)
- **GR** — Green Algae
- **DM** — Diatoms
- **FL** — Flagellates

Surface Bloom-forming Algae

Algae found in abundance near the surface of the water where light is present.

To ensure the best possible algal match or matches, read all questions under each category before selecting a genus or page number.

Is the algae:

1. Filamentous*?

A. Does it have a septic odour and net-like appearance?
Hydrodictyon Pg 14

B. When squeezed, does it look like cotton?
Cladophora Pg 14

C. Does it feel silky or slippery?
Spirogyra Pg 15

D. Is it abundant near shore and leaves behind dried masses of algal paper?
Oedogonium Pg 15

E. Also see “Attached algae and algal mats” Pg 28

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2. Planktonic*?

A. Is it like pea-soup? And/or has a pigpen odour?
Anabaena, Microcystis, Aphanizomenon Pg 16-17

B. Is it spherical or globular?
Gloeotrichia, Volvox, Nostoc Pg 18

C. Does it have a grassy odour?
Green algae, Ankistrodesmus Pg 19

D. Is the bloom throughout the water column? And deep green or green-black?
Oscillatoria, Pediastrum, Ankistrodesmus Pg 19-20

E. Does it look like grass clippings?
Aphanizomenon Pg 20

F. Does it look like bright green foam?
Euglena Pg 20

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3. Jelly ball or aquatic plant-like?

A. Are they small, disc-like, bright green and have small roots on their undersides?
Duckweed Pg 21

B. Are they large, jelly-like balls?
Nostoc Pg 21

C. Is it plant-like, has whorled branches and smells of garlic or skunk?
Chara Pg 22

4. Too small to see individuals or colonies? And the water is cloudy or coloured?

A. Does it smell like geraniums or ripe cucumber? Musty or fishy?
Asterionella, Synura, Dinobryon, Synedra Pg 23

B. Also see Question #2, as the algae might be at different stage of development

C. No smell, but the water is coloured reddish brown? Pg 25

D. Common bloomers Pg 24
Bright green foam - *Euglena*
Fishy smell and green water - *Chlamydomonas*
"Clean water" and clogged filter - *Cyclotella*

E. Other possibilities (no distinguishable field cues)
Scenedesmus, Closterium, Spirulina Pg 25

Planktonic or Filamentous Finger Test

Wearing gloves, scoop a handful of whatever is blooming in the water with fingers spread slightly apart. Let the water drain and examine what remains. If long, stringy masses are left dangling from the fingers, it is a filamentous form. If mostly everything drains through the fingers and only a few bits stick to the glove, then it is a planktonic form.

FILAMENTOUS

PLANKTONIC