# THE IMPORTANCE OF PIGWEEDS AND PIGWEED IDENTIFICATION

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Pigweed species (genus *Amaranthus*) are significant weedy pests in both agronomic and horticultural production systems. Results from surveys conducted by the Weed Science Society of America (WSSA) in 2019 and 2020 found that Palmer amaranth (*Amaranthus palmeri*), waterhemp (*Amaranthus tuberculatus)*, smooth pigweed (*Amaranthus hybridus*), redroot pigweed (*Amaranthus retroflexus*), Powell amaranth (*Amaranthus powellii*) and others were some of the most common and troublesome weeds of corn, alfalfa, cole crops, cucurbits and fruiting veg, among other commodities (https://wssa.net/wssa/weed/surveys/). In addition to being directly competitive, pigweed species have developed resistance to multiple herbicide active ingredients, which can limit control options (www.weedscience.org). For example, Palmer amaranth and waterhemp, two growing problems in NY, have populations in the US that are resistant to at least five different herbicides. While it may be convenient to lump all *Amaranthus* together when making management decisions, proper identification (ID) is important to develop the most effective management programs; this is especially true when herbicide resistance is involved and/or a novel species is spreading. Pigweed species can be difficult to identify in the field, especially at the seedling stage. This handout is part of a project funded by the NY Corn and Soybean Growers Association (www.nycornsoy.org) in partnership with the NY Farm Viability Institute (www.nyfvi.org) to improve grower weed ID skills. A formal ID booklet will be developed this year.

**PALMER AMARANTH:**

**Nativity:** Southwest US but found throughout much of the lower 48 states. **Leaves:** Diamond-shaped, sometimes with a V-shaped watermark on the leaf blade. Petioles on lower leaves are AS LONG OR LONGER than the leaf blades. Plant may resemble a poinsettia when viewed from above. Leaf surfaces lack hairs. **Stems:** Red or green or striped in color and lacking hairs (smooth). **Height:** Very tall, can grow to 8 to 10 feet. Plants can grow INCHES PER DAY under optimum conditions. **Flowers:** Male and female flowers are formed on branched, terminal spikes (which can be 2 to 3 feet in length) on SEPARATE plants. Male flower structures are soft and shed yellow pollen. Female flower structures produce stiff and sharp bracts and set seed.

*Palmer amaranth leaves presenting with a poinsettia-like appearance. Palmer amaranth leaves are diamond-shaped with petioles that can be much longer than the leaves (usually observed on older leaves). Male and female-flowers are held on separate plants; male flowers produce significant amounts of yellow pollen.*


*Palmer amaranth can grow very tall, rapidly. Flowers are tightly clustered on the flower spikes (inflorescences). Flower spikes can be highly branched and 2 to 3 feet in length. Female flowers are subtended by short, spiny bracts.*

**WATERHEMP:**

**Nativity:** Midwestern US but found throughout much of the lower 48 states. **Leaves:** Long and narrow and sometimes oval. Often darker green and shiny/waxy in appearance. Hairless. Petioles are shorter than the blade. **Stems:** Red or green or striped in color and lacking hairs (smooth). **Height:** Very tall up to 8 to 10 feet. **Flowers:** Male and female flowers are primarily formed on terminal spikes on SEPARATE plants. Male flower structures shed yellow pollen. Female flower structures set seed. Unlike Palmer amaranth, waterhemp's flowers are not as tightly clustered on the inflorescence; female flowers do not produce sharp bracts.


*Waterhemp leaves and stems.*

*Leaves are linear and may be almost oval.*

*Petioles are shorter than leaf blade.*

*Leaves may seem waxy in appearance. Stems are smooth/hairless. Stems may be red, green, or red and green striped.*

**REDROOT PIGWEED:**

**Nativity:** Native to and widespread in the lower 48 states. **Leaves:** Rounded at first, becoming more pointed with age. Edges have wavy margins. Veins are prominent on underside. Petiole shorter than leaf blade. Leaves can be hairy underneath or at least along the veins. **Stems:** VERY HAIRY, especially closest to newest growth. **Height:** 3 to 4 feet in height. **Flowers:** Male and female flowers are held in terminal inflorescences on the SAME plant. Branches on the flower spikes are short and thick/compact.

*Redroot pigweed leaves can be rounded while young, becoming more pointed when older. Margins are wavy. Stems and petioles are hairy. Leaf veins may also be hairy. Flower spikes are thick and compact. Male and Female flowers are found on the same plant.*

**SMOOTH PIGWEED:**

**Nativity:** Native to and widespread in the lower 48 states. **Leaves:** Egg- to oval-shaped becoming more pointed with age. Edges have wavy margins. Petiole shorter than leaf blade. **Stems:** Fine hairs throughout, especially closest to new growth. **Height:** 3 to 6 feet in height. **Flowers:** Male and female flowers are held in terminal inflorescences on the SAME plant. Branches are longer and thinner than redroot pigweed. Very difficult to distinguish from redroot pigweed until flowering.

**POWELL AMARANTH:**

**Nativity:** Native to and widespread in the lower 48 states. **Leaves:** Rounded at first, becoming more pointed with age. Edges have wavy margins. Petiole shorter than leaf blade. **Stems:** Fine hairs throughout, especially closest to new growth. **Height:** 3 to 6 feet in height. **Flowers:** Male and female flowers are held in terminal inflorescences on the SAME plant. Branches are longer than those of redroot pigweed and may appear to have bracts not unlike Palmer amaranth (but which aren't stiff and sharp). Can be confused with smooth and redroot pigweed, especially at seedling stages. Powell amaranth could be confused with Palmer amaranth at larger growth stages. Look at the stems, which are slightly hairy, as opposed to smooth for Palmer amaranth. The length of the petioles will also be shorter than the leaf blade. If flowering, look for the presence of male and female flowers on the same plant (palmer amaranth produces separate male and female plants).

*Smooth pigweed (left) and Powell amaranth (right). Smooth pigweed has leaves that start off round-, oval- or egg-shaped becoming more pointed with age. Leaf margins are wavy. Powell amaranth has diamond-shaped leaves without wavy margins*

*Smooth (left), Powell (center), and redroot (right) stems and flower spikes. Smooth and redroot pigweed are more densely hairy than Powell amaranth. Redroot pigweed flower branches are very tightly compact compared to smooth and Powell amaranths.*

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