
WHAT SMARTPHONE APPS ARE AVAILABLE FOR WEED ID? AND HOW GOOD ARE THEY?

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TODAY'S PRESENTATION

- Why is weed identification important?
- What traditional tools are available for weed ID?
- What about smartphone apps?
- How well do mobile tools perform?
- How can I improve my ability to get a successful ID?



WHY IS
WEED ID
IMPORTANT?

Photos by Lynn M Sosnoskie

WHY IS WEED ID IMPORTANT?

- Because weed management strategies are not equally effective against all weeds
- Selectivity
 - Herbicides that target grasses vs broadleaf species
 - Mowing that can differentially affect erect vs prostrate plants
 - Cultivation that can control annuals but not perennials
 - Timing of operations to target summer vs winter annuals
 - Herbicide resistance (selectivity can be fluid...)

WHY IS WEED ID IMPORTANT?

Differences in herbicide selectivity in closely related weed species

- Yellow nutsedge
- (*Cyperus esculentus*)

- Purple nutsedge
- (*Cyperus rotundus*)

- Sensitivity to metribuzin

Differences in selectivity in closely related herbicides

- Imazethapyr
- Pursuit

- Imazamox
- Raptor

- Grass weed control
- Raptor > Pursuit

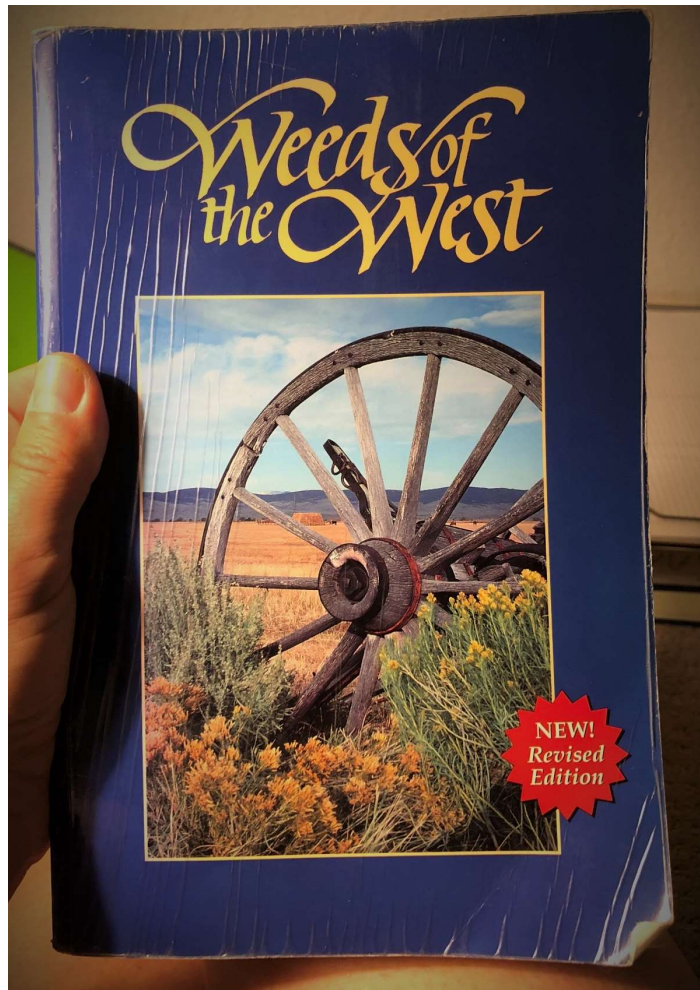
CONSEQUENCES OF IMPROPER HERBICIDE SELECTION

- Poor control
 - Reduced yields
 - Increased weed seed banks
- Wasted dollars
- Environmental impacts of unnecessary applications

WEED ID GIVES YOU A STARTING POINT

- A successful identification provides you with the basic knowledge that you need to develop a successful management plan
- Ideally, control strategies will be adopted based on the sensitivity of a target species to control measures

WEEDS OF THE WEST



Tom D. Whitson, et al.

Western Society of Weed Science

ISBN-13: 0-941570-13-4

Descriptions of >350 species

Species comprise 51 plant families

“Truck Book”

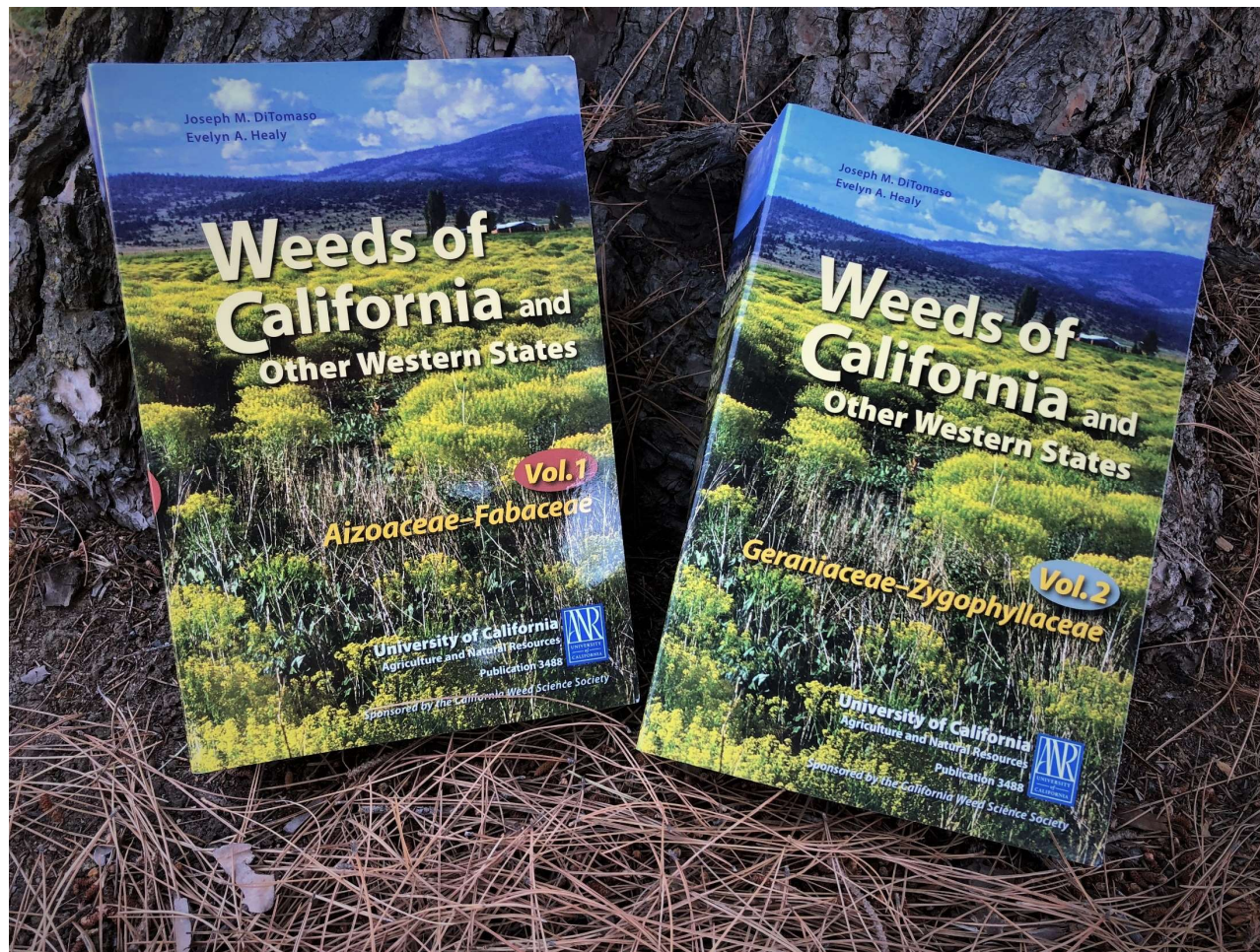
NO LONGER IN PRINT

NO UPDATES

NO ADDITIONAL SPECIES ADDED

NO CHANGES IN TAXONOMY

WEEDS OF CALIFORNIA AND OTHER WESTERN STATES



WEEDS OF CALIFORNIA AND OTHER WESTERN STATES

- Joseph M. DiTomaso and Evelyn A. Healy
- UC ANR Publication 3488
- ISBN-13: 978-1-879906-69-3

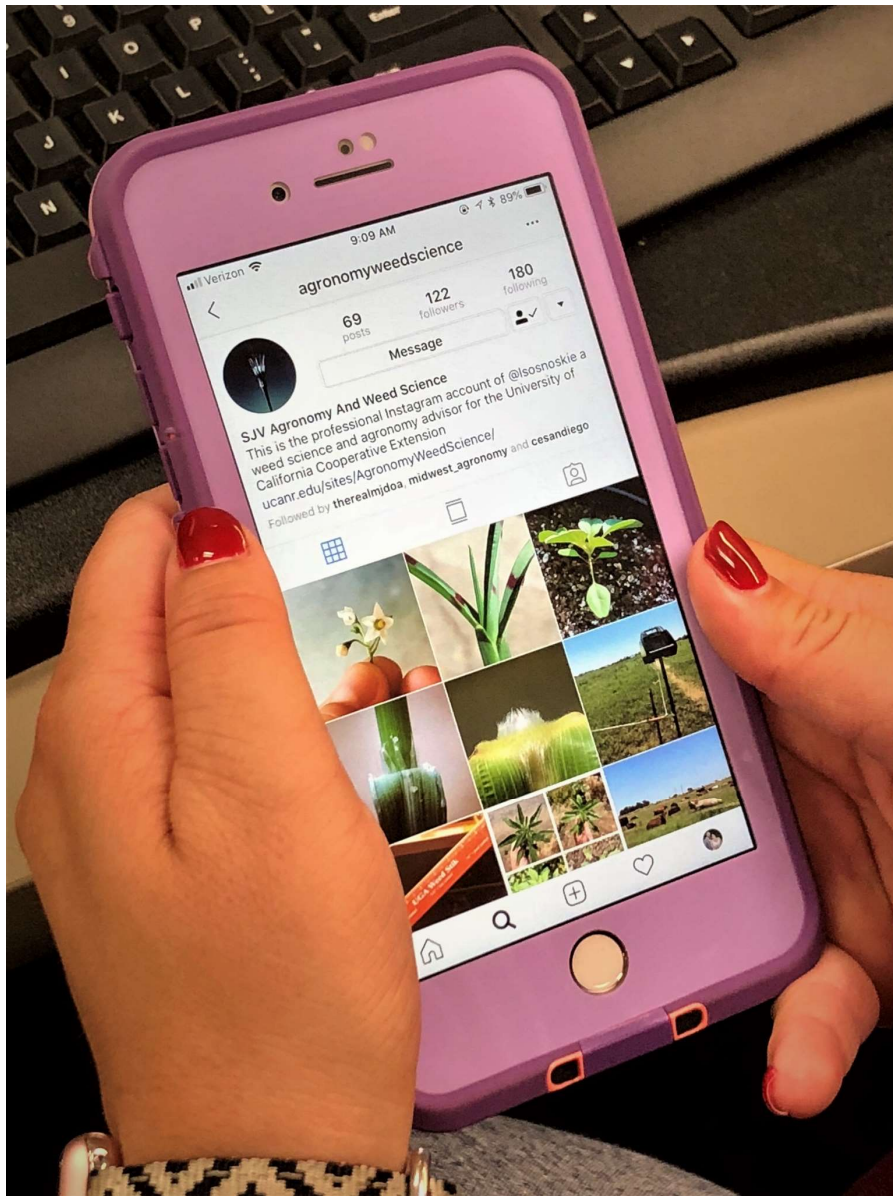
- Volume 1: Aizoaceae - Fabaceae
- Volume 2: Geraniaceae - Zygophyllaceae

WEEDS OF CALIFORNIA AND OTHER WESTERN STATES

- >700 species (>60 plant families) are described, photographed
- Specific subjects of interest or else as a comparative species
- ~60% non-native species, ~40% native species
- Photographs are provided on an included CD and are available use copyright free for educational purposes

WEEDS OF CALIFORNIA AND OTHER WESTERN STATES

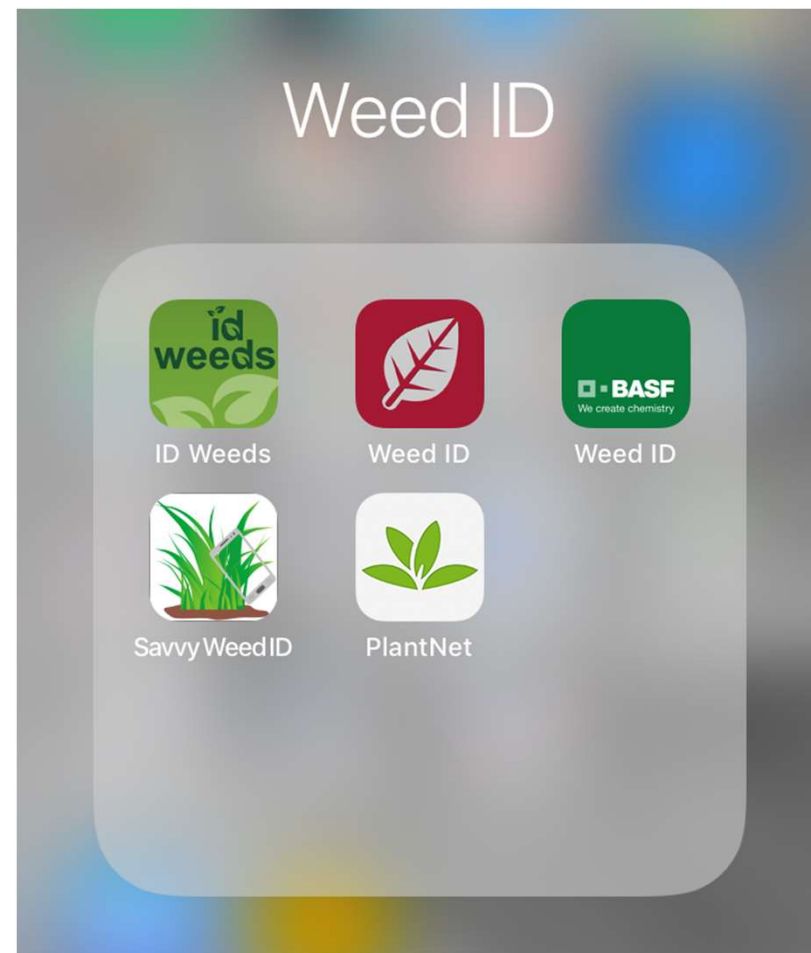
- 2 identification keys for the grass species
- 13 ‘shortcut’ tables describing the differences between species that share unique or uncommon traits
 - Species with prickles, spines, or thorns
 - Parasitic plants
- 67 tables summarizing the differences between difficult-to-distinguish species
 - *Amaranthus* (pigweed) species
 - *Lepidium* (pepperweed) species
- “Office book”



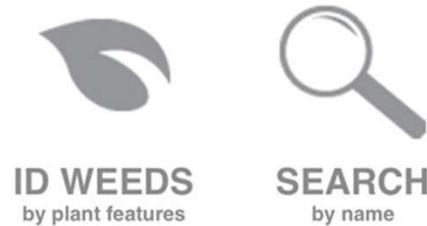
PHONE APPS

PHONE APPS THAT WORK LIKE DICHOTOMOUS KEYS

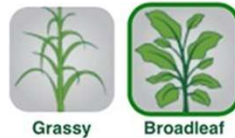
- ID Weeds
 - *University of Missouri*
- Weed Identifier
 - *'Monsanto' Canada*
- Weed ID
 - *BASF*
- Savvy Weed ID
 - *The Savvy Farmer Inc.*



ID WEEDS – UNIVERSITY OF MISSOURI



SELECT THE WEED CATEGORY



SELECT THE HABITAT



SELECT THE LEAF ARRANGEMENT



SELECT THE LEAF CHARACTERISTICS



Annual Sowthistle

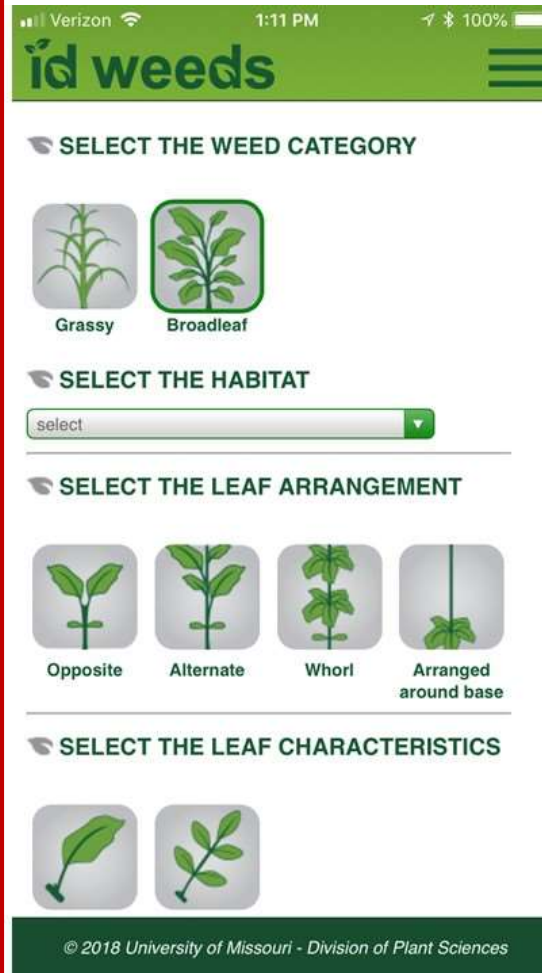
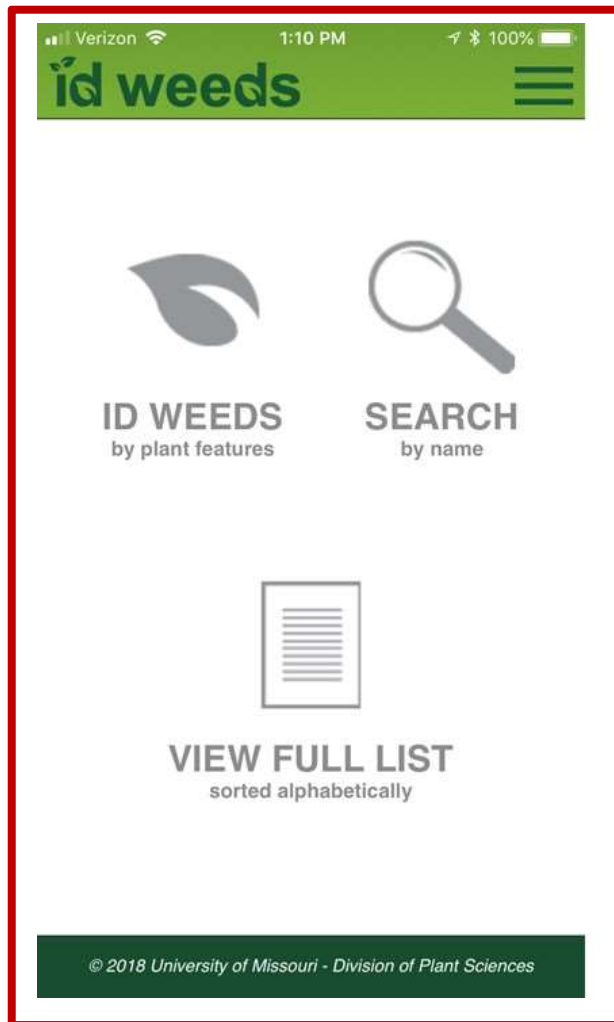
Sonchus oleraceus



Description: An annual with bluish-green leaves and stems that secretes a milky sap when cut. Found throughout the United States.

Seedlings: Cotyledons egg-shaped and have petioles. Young leaves are alternate, egg-shaped, and form a rosette. Both young leaves and

A SEARCH OF THE DATABASE CAN BE DONE BY SPECIES NAME



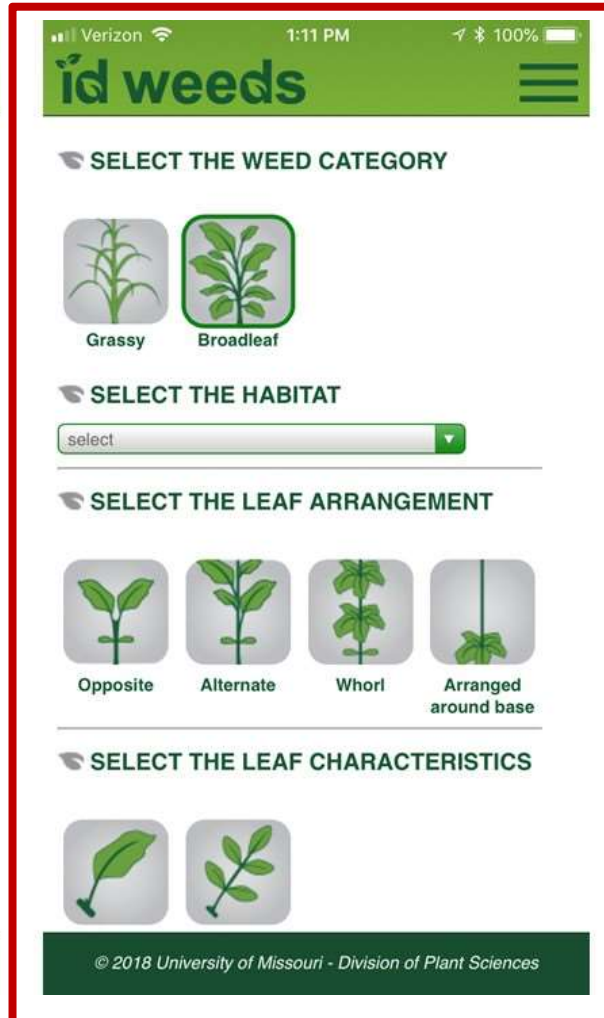
OR USERS CAN INPUT A SERIES OF DEFINING CHARACTERISTICS TO GENERATE A LIST OF POTENTIAL SPECIES



ID WEEDS
by plant features

SEARCH
by name

VIEW FULL LIST
sorted alphabetically



SELECT THE WEED CATEGORY



Grassy



Broadleaf

SELECT THE HABITAT

select

SELECT THE LEAF ARRANGEMENT



Opposite



Alternate



Whorl



Arranged
around base

SELECT THE LEAF CHARACTERISTICS



Annual Sowthistle

Sonchus oleraceus



Image 1 of 4



Description: An annual with bluish-green leaves and stems that secretes a milky sap when cut. Found throughout the United States.

Seedlings: Cotyledons egg-shaped and have petioles. Young leaves are alternate, egg-shaped, and form a rosette. Both young leaves and

ONCE THE TARGET IS IDENTIFIED, THE APP PROVIDES INFORMATION ABOUT THE SPECIES BIOLOGY, LIKE ANY OTHER GUIDE BOOK



SELECT THE WEED CATEGORY



SELECT THE HABITAT



SELECT THE LEAF ARRANGEMENT



SELECT THE LEAF CHARACTERISTICS



Annual Sowthistle

Sonchus oleraceus



← Image 1 of 4 →

Description: An annual with bluish-green leaves and stems that secretes a milky sap when cut. Found throughout the United States.

Seedlings: Cotyledons egg-shaped and have petioles. Young leaves are alternate, egg-shaped, and form a rosette. Both young leaves and

YOUR BOTANICAL KNOWLEDGE IS CRITICAL GETTING AN ACCURATE ID

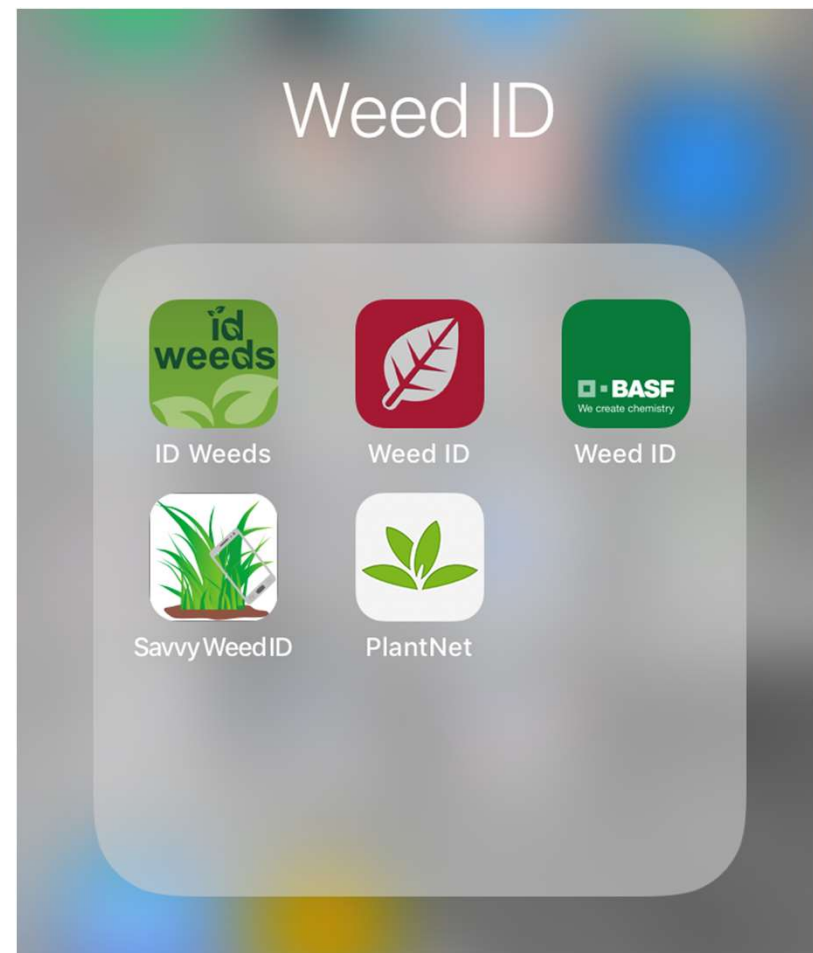
The results depend on you...

Too little info:

Lots of potential species could be returned in the results that you will need to wade through and evaluate

Too much (incorrect) info:

Fewer species returned in the results, but the actual target species might not be one of them...



BUT THE DATABASE NEEDS TO INCLUDE THE TARGET SPECIES, TOO...

Note:

Many weed species common to the Western US may not be included in these apps because they are (IMO) focused on Midwestern systems

But databases can always be expanded...

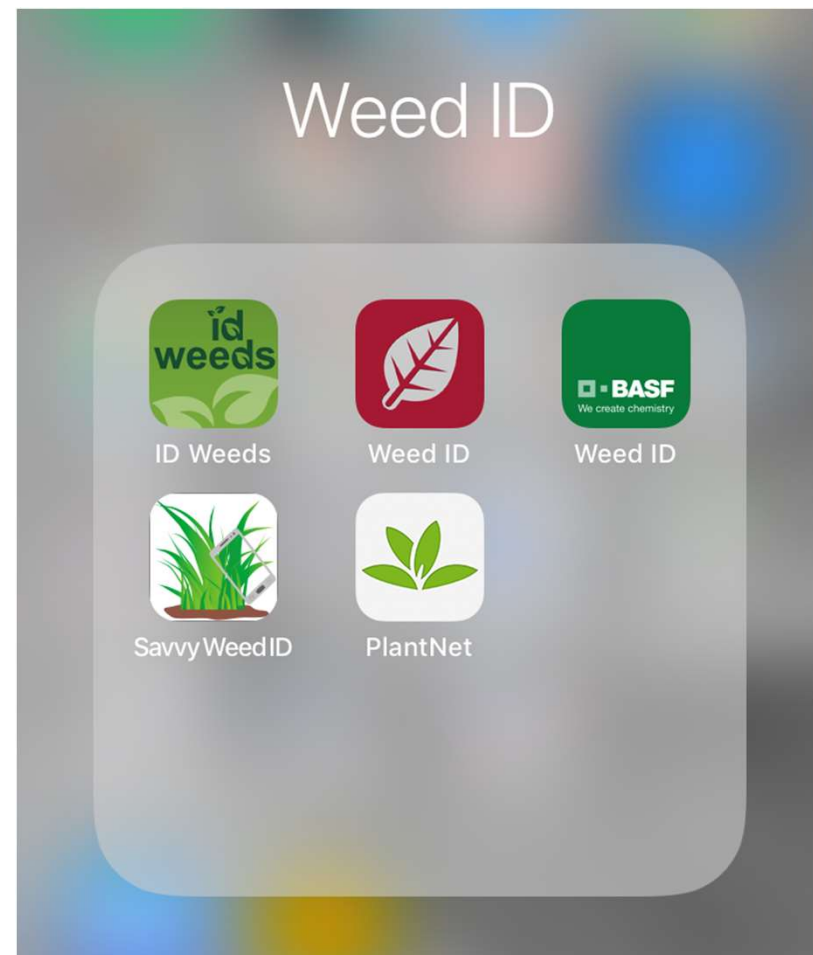
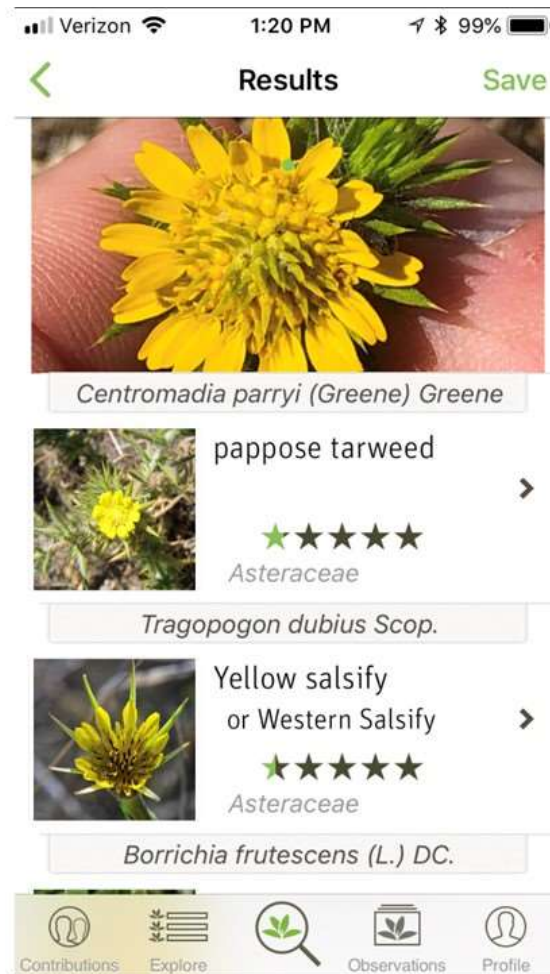


Photo by Lynn M Sosnoskie

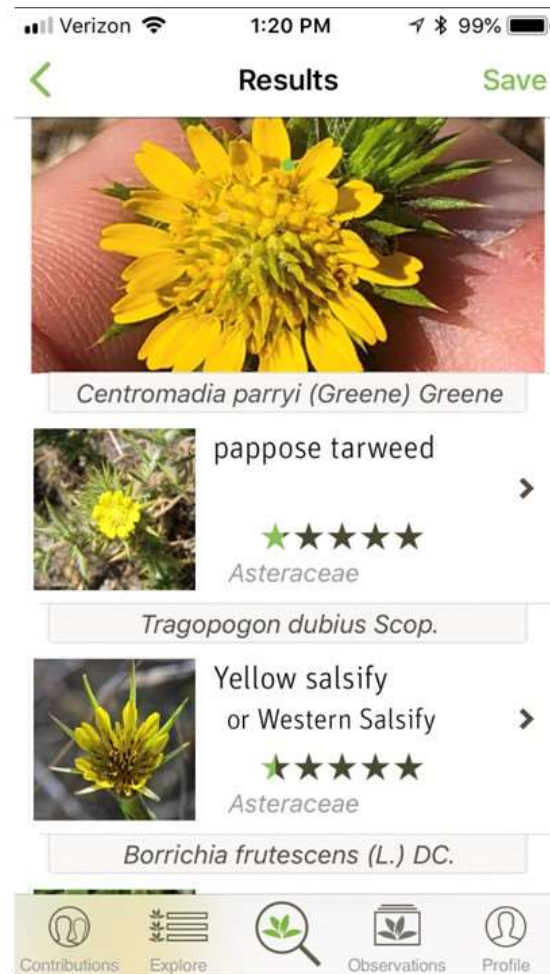
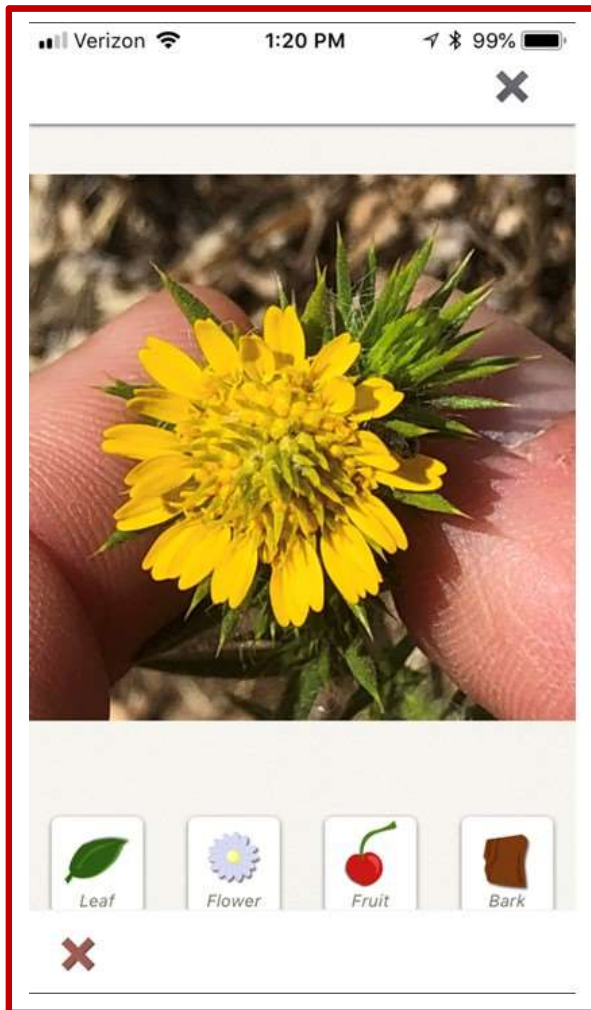


IS THERE AN
APP THAT CAN
IDENTIFY A
WEED FROM A
PHOTO?

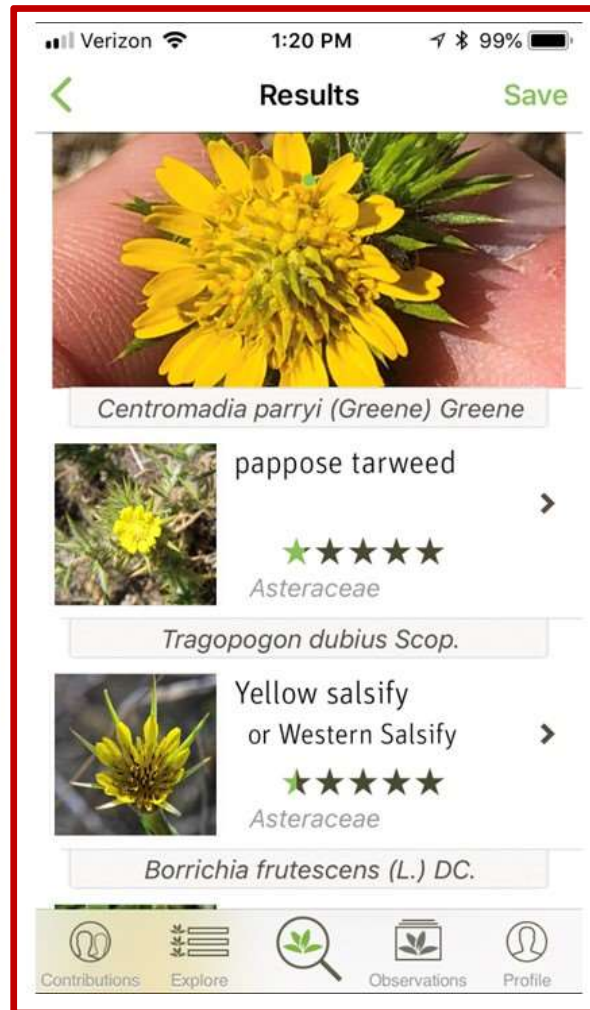
PL@NTNET



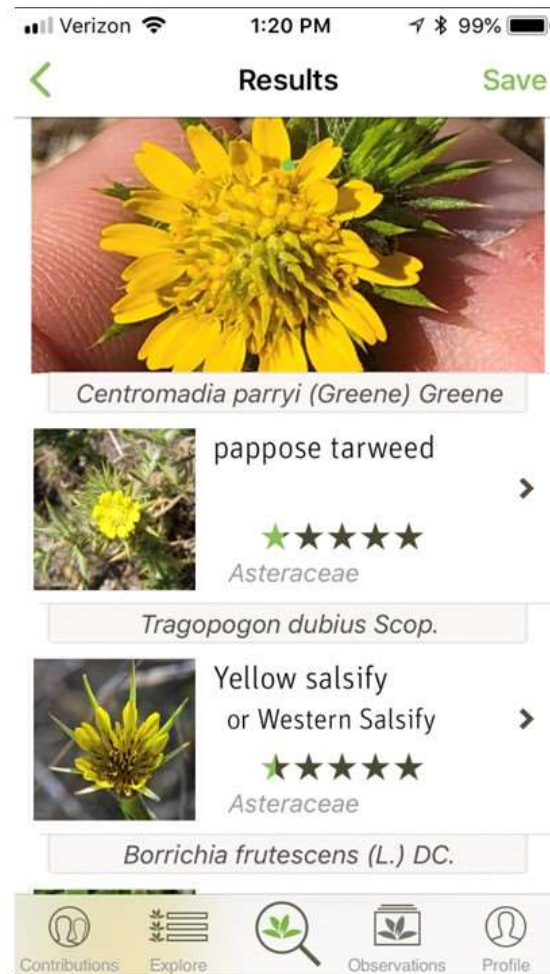
PL@NTNET USES VISUAL RECOGNITION SOFTWARE TO COMPARE YOUR UPLOADED PICTURE TO A DATABASE OF IMAGES



AFTER SCANNING AND COMPARING YOUR IMAGE, PL@NTNET RETURNS A LIST OF POTENTIAL SPECIES



YOU CAN GET FURTHER INFORMATION ABOUT EACH SPECIES VIA A LINK THAT TAKES YOU TO ITS WIKIPEDIA PAGE



AVAILABLE DATABASES (PROJECTS)

The PI@ntNet app has multiple databases (projects) that a user can draw upon to evaluate a specimen depending on where they are in the world

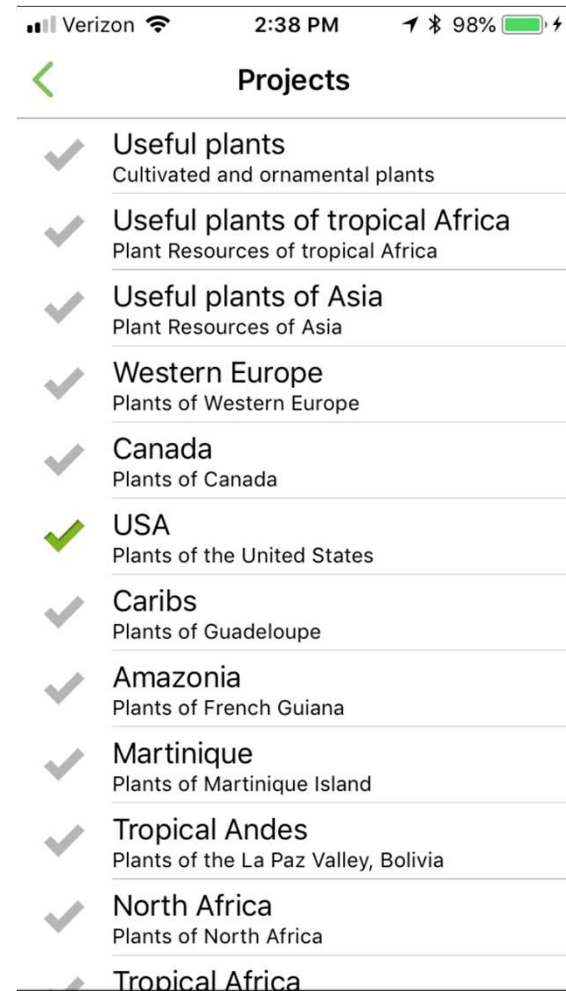




Photo by Lynn M Sosnoskie

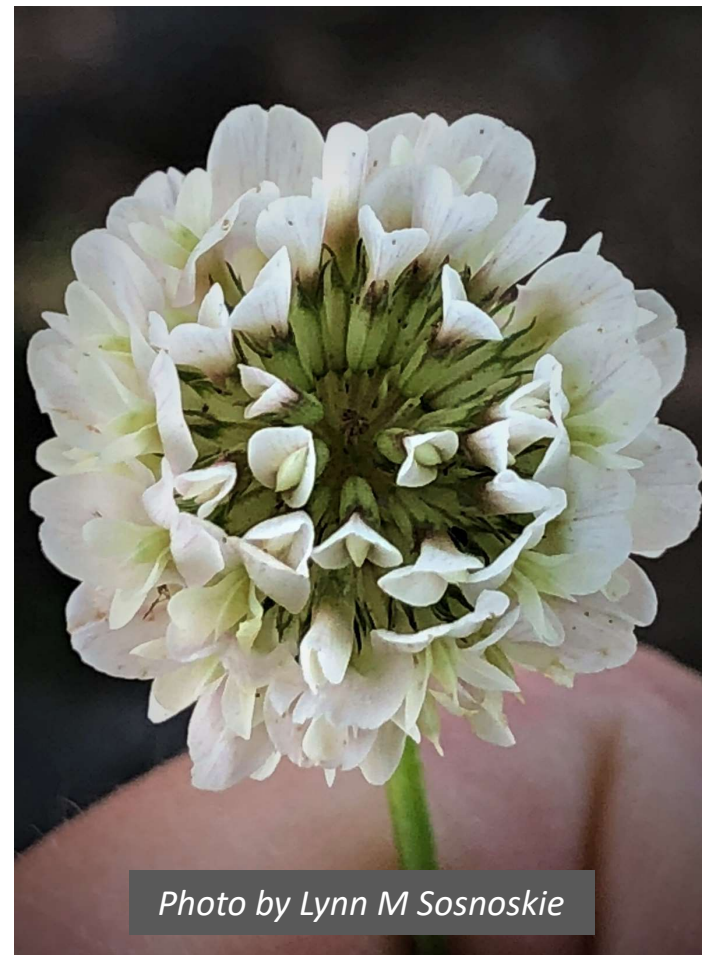
HOW WELL
DOES
PL@NTNET
WORK?

60 IMAGES OF 46 SPECIES IN 21 FAMILIES

- Amaranthaceae (3)
- Apiaceae (1)
- Apocynaceae (1)
- Asteraceae (10)
- Brassicaceae (1)
- Caryophyllaceae (1)
- Chenopodiaceae (2)
- Convolvulaceae (2)
- Euphorbiaceae (2)
- Fabaceae (2)
- Lamiaceae (1)
- Malvaceae (4)
- Montiaceae (2)
- Mysinaceae (1)
- Plantaginaceae (1)
- Poaceae (6)
- Polygonaceae (1)
- Portulacaceae (1)
- Ranunculaceae (1)
- Solanaceae (2)
- Zygophyllaceae (1)

60 IMAGES OF 46 SPECIES IN 21 FAMILIES

- 31 pics of leaves
- 21 pics of flowers
- 8 pics of leaves + flowers



RESULTS OF THE IMAGE CHALLENGE

Outcomes	Number of observations	Percent (%) of total
Species not on list	9	15
Species ranked first	36	60
Species ranked second	7	12
Species ranked third or below	8	13

BUT...

- Unconscious bias could have played a large role in achieving these results
- The images were captured by a weed scientist who is aware of the morphological traits that can be used to distinguish among species
- It is not unreasonable to assume that this knowledge could have unknowingly contributed to the observed success
- If you don't know what you are looking at, you might not easily capture images of the most defining characteristics

SOME OF THE DIFFICULTIES LIKELY TRANSCEND THE TOOLS THAT YOU CHOOSE TO USE

- Seedlings (both broadleaves and grasses) seemed more difficult to identify, correctly, than mature plants
- Grass ID was most effective when surveying inflorescences as compared to vegetative tissue

HOW DO YOU IMPROVE YOUR CHANCES?

Take clear and focused pictures

Minimize the background

Try submitting multiple images of different structures

- leaves
- flowers
- spines or bracts



IN SUMMARY

- Weed ID is important
- Lots of tools are available
 - *Weed ID Guides*
 - *Phone apps*
- Mistakes can/will be made
 - Doublecheck your work
 - *CalFlora*
 - *Weed Science Advisors*



Photo by Lynn M Sosnoskie

THANK YOU



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agronomyweedscience on Instagram