



GILA RIVER INDIAN COMMUNITY DEPARTMENT OF ENVIRONMENTAL QUALITY

PESTICIDE
CONTROL OFFICE

Community
Applicator
Certification
Training



Image Credit: National Pesticide Information Center, OSU

Module 4: Pesticide Formulations



Pesticide Formulations

This Module Will Help You:

- Recognize formulation abbreviations
- Identify formulation advantages and disadvantages
- Understand role of adjuvants





Important Definitions

- **Active Ingredient (Ai):** The actual chemical in the product mixture that controls the pest
- **Inert Ingredient:** Other materials added with the Ai when the product is formulated
- **Phytotoxicity:** Plant damage
- **Adjuvant:** Product added to spray tank to assist pesticide in its application



Pesticide Formulation

Active ingredients (**Ai**) will be listed along with inert (other) ingredients

- Water
- Emulsifiers
- Solvents
- Dry carrier material
- Stabilizers
- Dye
- Surfactants

1.0 INGREDIENTS

ACTIVE INGREDIENT:

*Glyphosate, N-(phosphonomethyl)glycine
in the form of its isopropylamine salt 41.0%

OTHER INGREDIENTS: 59.0%
100.0%

*Contains 480 grams per liter or 4 pounds per U.S. gallon of the active ingredient glyphosate, in the form of its isopropylamine salt. Equivalent to 356 grams per liter or 3 pounds per U.S. gallon of the acid, glyphosate.

No license granted under any non-U.S. patent(s).

Honcho label
Image Credit: GRIC PCO



Why Add Inert Ingredients?

- For ease of pesticide product handling
- Inerts make measuring and mixing pesticides easier
- To provide for safety
- Makes the Ai work better
 - Better penetration
 - More selectivity
 - Increased effectiveness





Adjuvant

- The term adjuvant basically means additive
- Labels will often recommend to add an adjuvant
- Include surfactants, spreaders, wetting agents, colorant dyes, buffers, antifoaming agents, etc.
 - Formulation additive
 - Additive which is sold separately to mix with the product when tank mixing



Image Credit: Tony McCandless, GRIC PCO



Adjuvant

Basically... an Additive to the Tank Mix or Formulation

Surfactants – group

- Wetting agents
- Spreaders
- Emulsifiers
- Stickers/Extenders

Others

- Buffers
- Compatibility agents
- Defoaming agents
- Colorants/dyes
- Safeners
- Thickeners





Adjuvants

How to Choose the Right One

- Read the pesticide label for recommendations
 - Some may prohibit use of an adjuvant
- Don't use industrial products or household detergents
- Test before you spend \$\$
- Remember, many pesticide products contain an adjuvant



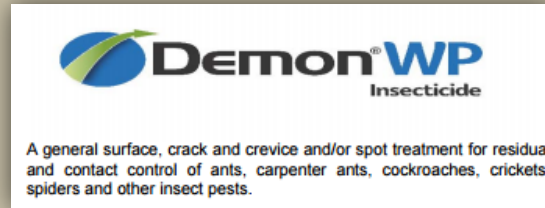


Deciphering the Ai Codes in Product Names



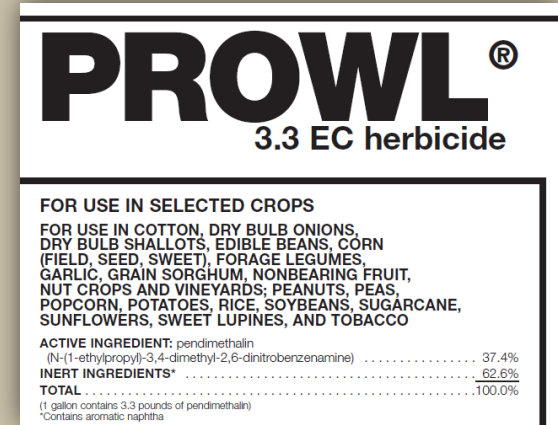
SC

Suspended Concentrate



WP

Wettable Powder



3.3EC

3.3 lbs. Ai/ 1 gal.



15G

15% Ai
Granular



Brand Name Abbreviations

Often brand names include abbreviations that describe something about the formulation

D – dust

G – granular

SP – soluble powder

S – solution

WP – wettable powder

EC – emulsifiable concentrate

DF – dry flowable

WDG – water dispersible granule

WSP – water soluble packet

ULV – ultra low volume

RTU – ready to use

GL – gel

LO – low odor





Liquid Pesticide Formulations





Dry Pesticide Formulations





Dust and Granule Pesticide Formulations





Bait Pesticide Formulations





Selecting a Formulation

- Evaluate advantages and disadvantages
- Do you have the right application equipment?
- Can the formulation be applied when and where it is needed?
- Will the formulation reach the target pest and be there long enough?

7.7 Colorants or Dyes

Colorants or marking dyes may be added to spray solutions of this product; however, they can reduce performance. Use colorants or dyes according to the manufacturer's recommendations.

7.8 Drift Reduction Additives

Drift reduction additives may be used with all equipment types, except wiper applicators, sponge bars and Controlled Droplet Applicator (CDA) equipment. When a drift reduction additive is used, read and carefully observe the precautions, limitations, and all other information appearing on the additive label. Use of drift reduction additives can affect spray coverage, which can reduce product performance.

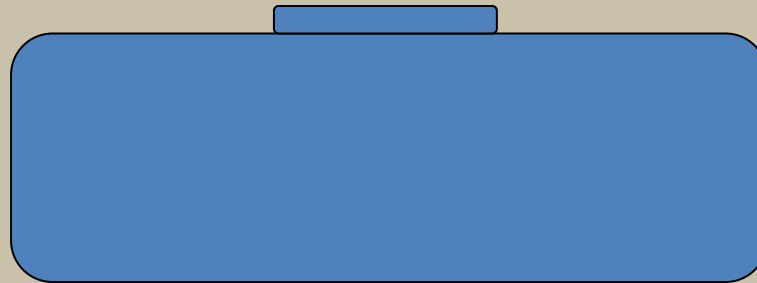
Honcho label
Image Credit: GRIC PCO



Solution

Active Ingredient TRULY dissolves in water

Just like sugar or salt in water
usually transparent



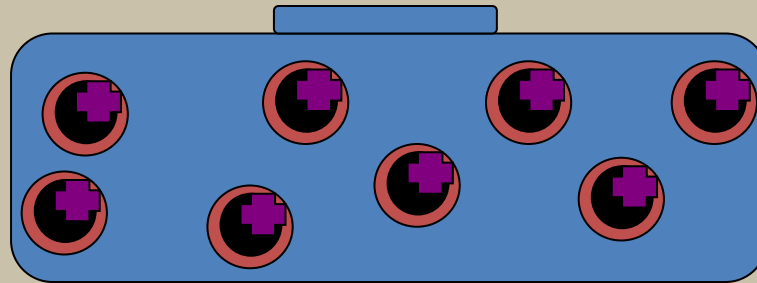
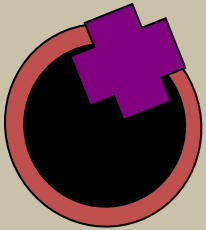


Suspension

Solid particles suspended in a liquid like hot chocolate

Active Ingredient (high %)
impregnated onto dry carrier
and mixed with an emulsifier (slick, soapy)

**Agitation
Required**

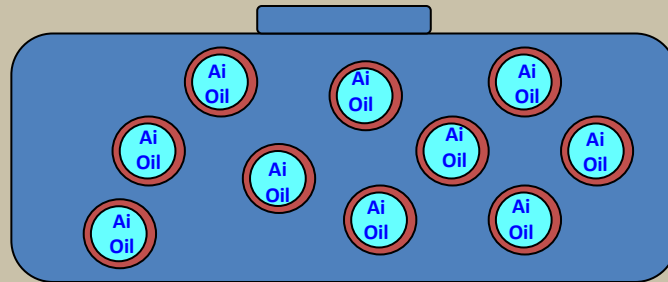
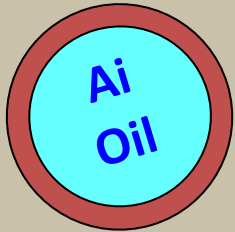




Emulsion

One liquid dispersed within another liquid like milk

Ai is dissolved in oil (oil/ai droplet) and mixed with an emulsifier
Ai/Oil mixture is suspended in water forming a white emulsion





Pesticide Formulations

Advantages and Disadvantages to each Formulation

Examples of advantages:

- Easy to handle
- Little agitation
- Relatively easy on equipment
- Leaves little residue
- Use indoor/outdoor
- Reduce drift or runoff
- Ready to use
- Control pests that move in and out of an area

Examples of disadvantages:

- Phytotoxic – plant injury
- Easily absorbed by the skin
- Flammable
- Deterioration of rubber and plastic hoses
- Drift hazards
- Specialized equipment needed
- Calibration critical



Pesticide Mixtures

- Tank mixing multiple products is legal unless prohibited by the label
- Manufacturer notes *known* incompatibilities on label
- Incompatibility
 - Heat, clumping, precipitate
 - Inactivity of active ingredients
 - Use Jar-Test to test for incompatibility
 - Field incompatibility can still occur

TANK MIXING INSTRUCTIONS **W-A-L-E-S METHOD**



Wettable powders and water dispersible granules

Agitate tank mix thoroughly

Liquid flowables and suspensions

Emulsiifiable concentrate formulations

Surfactants/Solutions



Acknowledgements

Adapted with permission from the Washington State University
Urban IPM and Pesticide Safety Education Program
for use by the

GILA RIVER INDIAN COMMUNITY
Department of Environmental Quality
Pesticide Control Office

PO Box 2139 • 45 S. Church Street • Sacaton, AZ 85147

Office (520) 562-2234 • Fax (520) 562-3198

Email: GRIC.Pesticide.Office@GRIC.nsn.us

Web: www.GRICDEQ.org