



WHAT ON EARTH  
IS A WEED?

# WEEDS AS FOE

- Reduce farm productivity
  - Outcompete desired forages
- Are costly to deal with
- An ongoing/never-ending issue
- Develop resistance to current treatments



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## WEED SEED BANK

In a meter<sup>3</sup> of soil there may be thousands of weed seeds



# WEEDS AND SOIL SIGNALS

Weeds are here to tell us something



WEEDS: DOCTORS OF  
THE SOIL  
READ YOUR WEEDS:

1. Quickly protect bare soil
2. Low organic matter
3. Balance minerals
4. Microbial imbalances and/or
5. As a safety valve for toxins.

# WHAT IS A PLANT CORRECTING?

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- Look to root systems and growth forms
- Many broadleaf weeds: functional P:K ratio
- Scrambling weeds- protecting carbon losses
- Deep tap roots- dynamic accumulators





## Weeds as Indicators

- Many weed species are indicating low available **Ca** and humus
- Primitive grasses; : low **Ca**, compaction, overgrazing, disturbance



## READ YOUR WEEDS

- Tissue test weeds vs your favoured plant species
- If it is a dynamic accumulator:
  - Mineral imbalance



<i>Nutrient</i>		<i>Units</i>	<i>Rye</i>	<i>Capeweed</i>
Nitrogen	N	%	2.57	2.18
Phosphorus	P	%	0.21	0.24
Potassium	K	%	2.39	2.30
Sulfur	S	%	0.18	0.18
Carbon	C	%	44.5	42.8
Calcium	Ca	%	0.46	<b><u>1.43</u></b>
Magnesium	Mg	%	0.24	0.32
Sodium	Na	%	0.16	<b><u>1.17</u></b>



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Copper	Cu	mg/kg	6	9
Zinc	Zn	mg/kg	16	<u>27</u>
Manganese	Mn	mg/kg	47	59
Iron	Fe	mg/kg	60	88
Boron	B	mg/kg	4	<u>39</u>
Molybdenum	Mo	mg/kg	0.5	0.4
Cobalt	Co	mg/kg	<0.1	<0.1
Crude Protein	ratio	%	16.1	13.6
Nitrate	N	mg/kg	62.6	<u>133</u>
Ammonium	N	mg/kg	686	407

- Weeds correlated with soil test which showed low Ca, Na, Zn, B and HIGH Nitrates.
- Weeds accumulate minerals which are low. – (exceptions are Na and Nitrates)

# NITRATES

- Bacteria create alkaline exudates.
- Nitrifying bacteria make an enzyme to pull H off  $\text{NH}_4$ , replace with an O =  $\text{NO}_2$  (nitrates)

- Signal for nitrate weeds
  - pigweed, fat hen, nettles, thistles, nightshade, Kochia, marshmallow, Russian thistle, foxtail barley, ...



# Weeds of excess

- Excess nutrients
- **N, K**
- Very high biological activity
- Imbalance in **N** cycle
- Low protozoa
- Low carbohydrates





## SODIUM

- Some 'weeds' are able to draw excess sodium up into their leaves
- Foxtail barley has a mycorrhizae which has adapted to high sodium



## Balance *excesses*

- Balance soil minerals
- Feed fungi
- Humates
- Inoculate with protozoa
- Compost manures
- Smaller paddocks – move stock more often, with longer recoveries



# MESQUITE

## Nutritional foliar application



# MESQUITE NUTRITIONAL APPLICATION

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- 2.5 kg of manganese sulfate
- 450 grams of solubor
- 450 grams of zinc sulfate
- 450 grams of magnesium sulphate
- 450 grams fulvic acid

Sufficient for 25 acres



# CHELATED TRACE RECIPE

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**First mix dry ingredients, using this order. Putting each in one at a time and blending/ stirring/mixing gently to even blend, then add the next and repeat, etc.** Imagine you are rolling bread dough.

- 2.5 kg of manganese sulfate
- 450 grams of solubor
- 450 grams of zinc sulfate
- 450 grams of magnesium sulphate

- **Chelation process**

**Into 100 litres of water**

- Put low/slow bubbler into water (**important for this to be gentle**). Can just use aquarium bubblers, want to see the mix is slowly turning over.
- Take the above trace mix, gently poured and stirred/agitation so have good solubilizing.
- Now blend in **450 grams of fulvic acid** (chelator) and bubble/blend for a minimum of 6 hours.
- Can store this mixture at this form with capped bottle for future use.
- **Applying the mix**
- **When ready to go spray, ADD to 500 litres of extract (1:9 ratio of vermicast : compost) to 20 litres of trace blend.**
- This can then be mixed with **1480 litres water** before foliarly applying to 25 acres. (Total 80 litres/ac applied)

# BIOLOGICAL INDICATORS

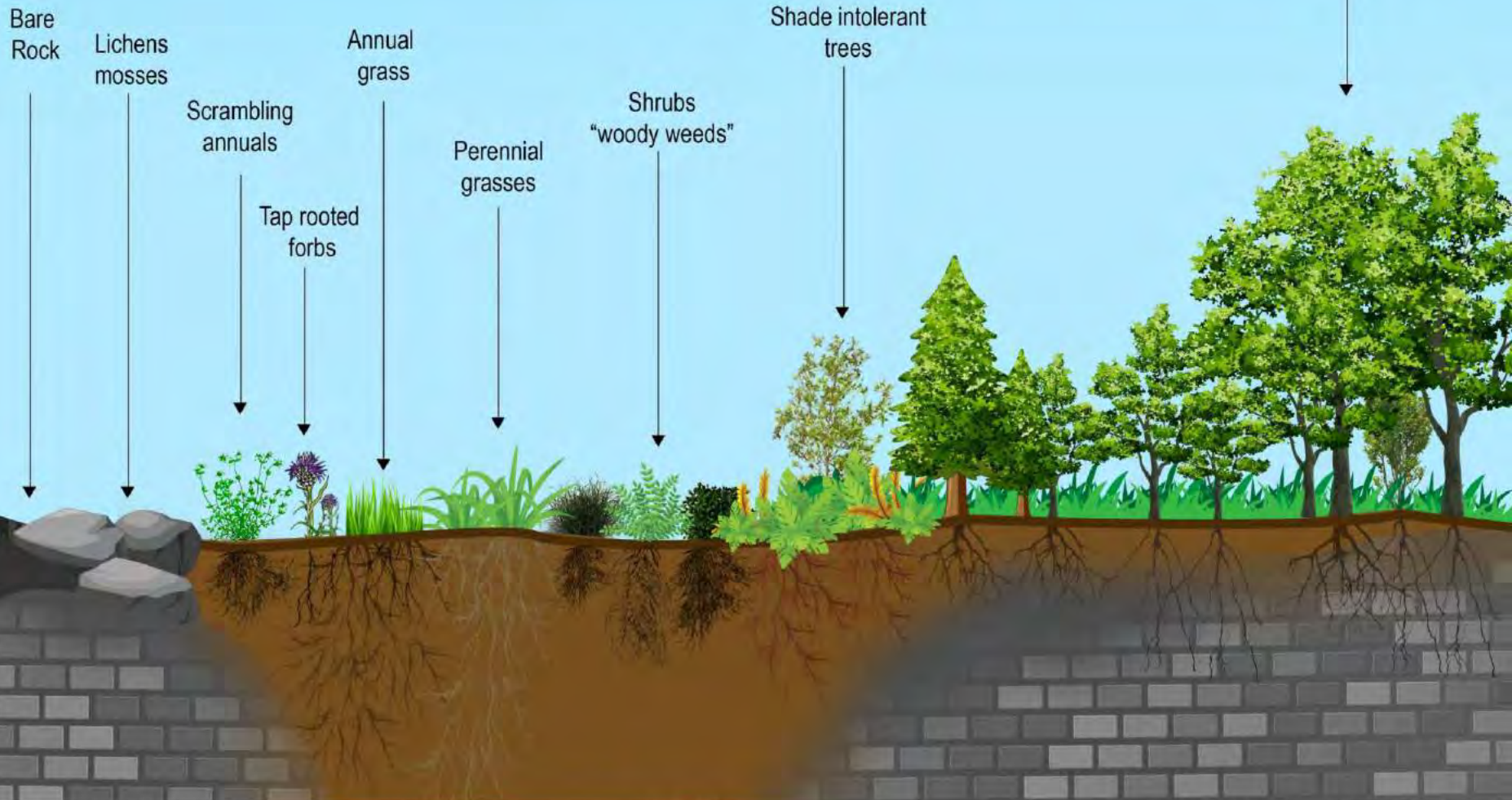
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# DISTURBANCE EVENTS

Due to natural events or human impacts





BACTERIAL DOMINATED

1:0.75

1:1

1:4

FUNGAL DOMINATED



Pasture ploughed;  
Slicing and dicing  
Fungi.  
1:1 reduces to 0.75  
Perfect ratio for Kale



Kale ploughed;  
Slicing and dicing  
Fungi.  
0.75 reduces to 0.5  
Perfect for early  
succession weeds.





Cotopaxi, CO  
Steve and Nancy  
Oswald  
Oswald  
Cattle Company

Project with Annie Overlin  
2020-2021



Cotipaxi, CO, July 2021  
25# /ac Johnson Su- high fungal  
compost applied as a liquid extract

Diverse cover crop planted into  
highly bacterial soils









If left undisturbed succession  
advances



# WEEDS OF EXCESS

- Excesses of minerals
- Toxin release



# Nitrates

- Bacteria create alkaline exudates.
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- Signal for nitrate weeds

-pigweed, fat hen, nettles, thistles, nightshade, marshmallow, thorn apple, Patterson's curse, foxtail barley, kochia, ...

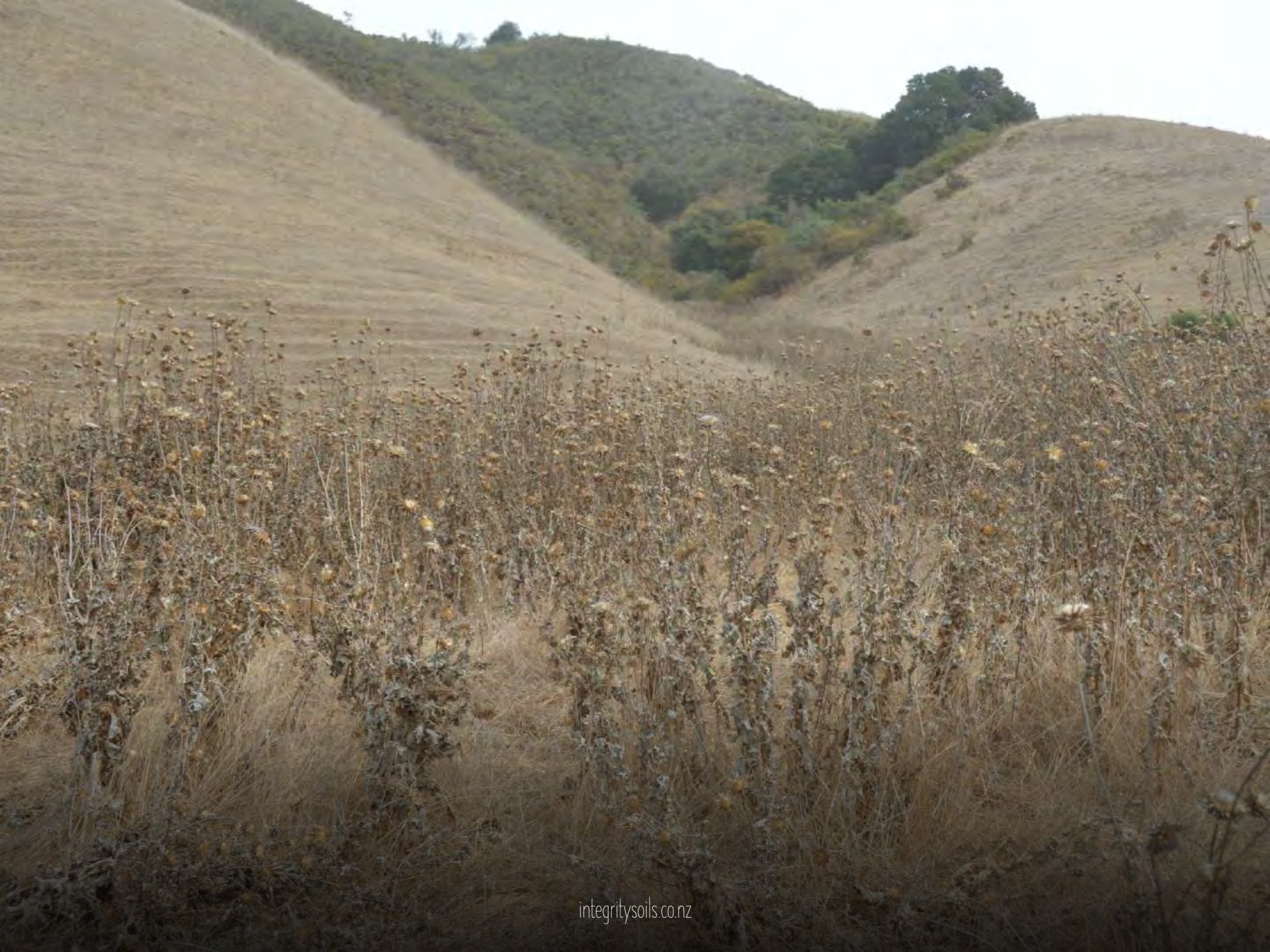




## Release valves

- Rats tail/barley grass
- Russian thistle
- Patterson's curse
- Milk thistle







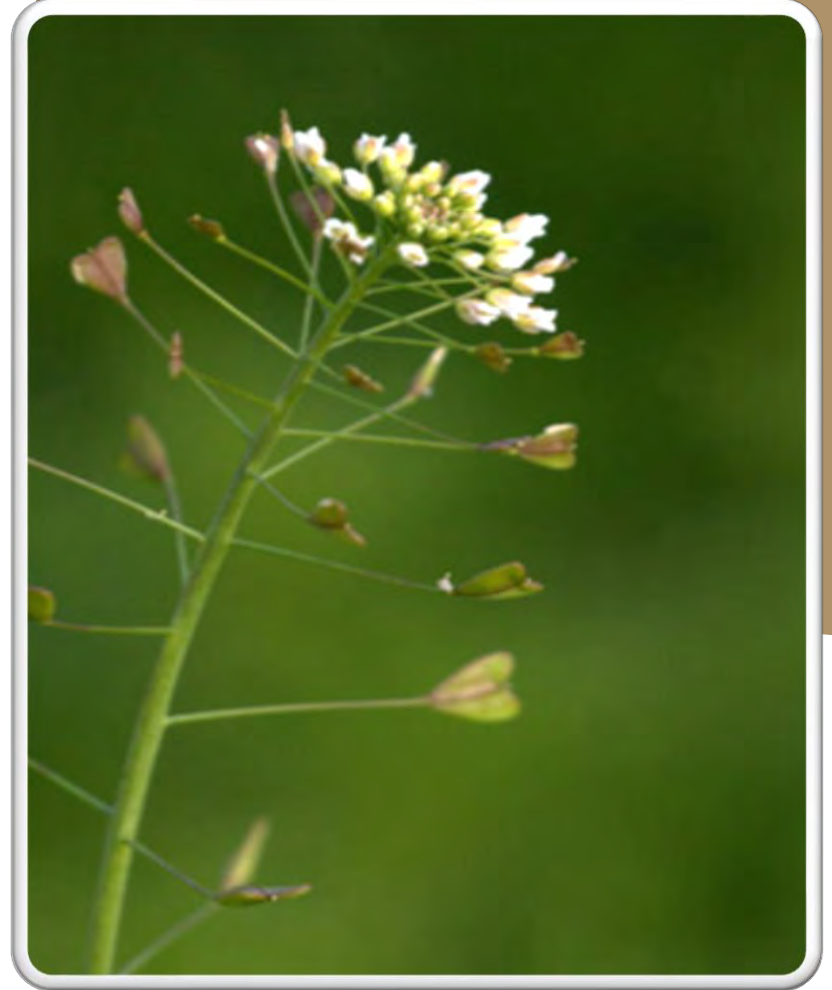
## Actions for release valve weeds

- Test pastures with refractometer
- Avoid grazing
- Soil test for possible contamination
- Humates, BioChar, milk, milk thistle
- Build soil carbon!!!



## Non – mycorrhizal

- Pigweed
- Lambsquarters
- Brassica – mustard, radish, shepherds  
purse, Russian thistle
- Lupin
- Kochia
- Sedges and rushes





# ADDRESSING WEEDS AT THEIR ROOT

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# Alderspring Ranch, May Idaho



- 46,000 acres
- Organic
- In-herding
- 4-7 interns live and move with cattle every day
- No repeat bite 1-6 years





- Lifted OM from 2% to 4.5% in 6 years
- 300% increase in groundcover and plant diversity
- Minimal invasive non-native species



# Indreland Angus

*Montana Stockgrowers  
Association 2011*





# Dryland mix

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- 10kg Epsom salt
- 10kg mineral salt
- 2kg solubor
- 20 litre fish hydrolysate
- 5 cups sugar
- 5 kg vermicast
- 5kg Manganese sulfata
- 2 kg kelp
- 1 Tbsp yeast
- Vitamins





Field ID	Sample ID	% N	% P	% K	% S	% Ca	% Mg	ppm Zn	ppm Fe	ppm Mn	ppm Cu	ppm B	ppm Mo
HAIRY VETCH	TREATED	4.04	0.283	2.65	0.21	1.567	0.304	33	86	38	8.9	17.4	1.44
HAIRY VETCH	UNTREATED	3.87	0.251	2.57	0.21	1.326	0.173	26	63	32	10.9	13.3	8.31



# Test foliar efficiencies

- Apply the foliar spray to a test plot
- After a minimum of 40mins of sunshine, test the Brix of the treated plants as well as the untreated plants
- Looking for the test area to be at least 2 Brix higher than the control area





## Reducing herbicides

- Herbicides and pesticide use can be reduced by 10-30% decreasing pH ~ citric or fulvic acids
  - With the same efficiency!
- Lift functional Calcium (fungi) to reduce grass weed pressures
- Lift available phosphorus to reduce many broadleaf weeds
- Spot spray- not boom

# Buffer chemicals with Carbon

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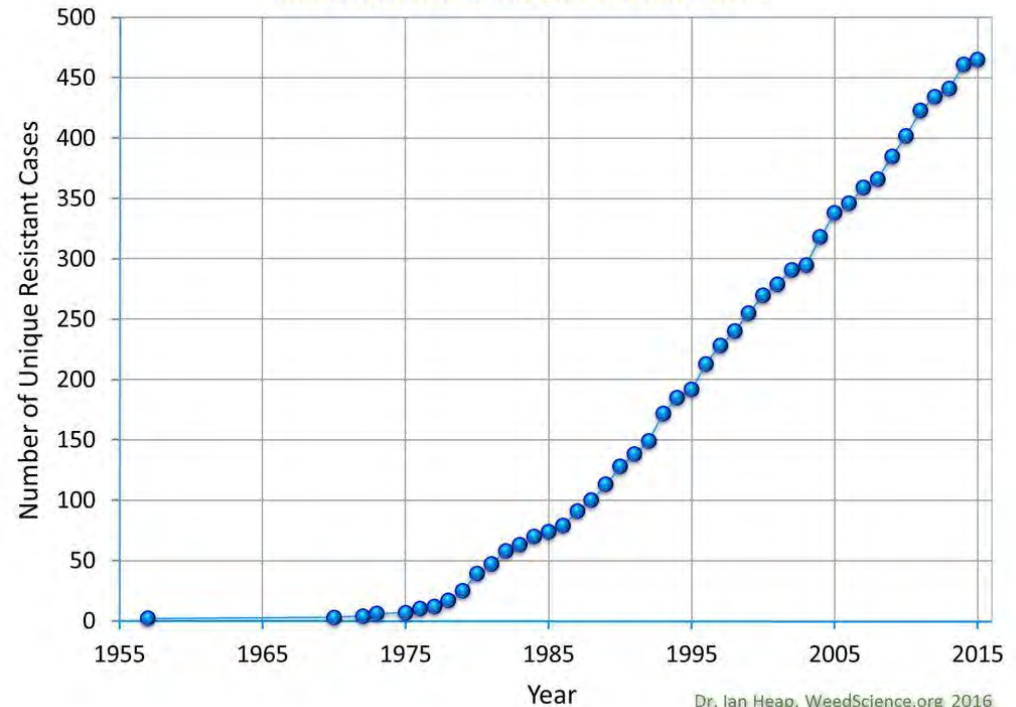
- Fulvic/humic lift cell wall permeability by 30%
- Fulvic acid 1 part to 4 parts glyphosate
- Reduce herbicide use by 30%



# Herbicide resistance

- Some plants can over express genes related to the mode of action
- E.g. glyphosate resistant weeds over-express the shikimate pathway

Global Increase in Unique Resistant Cases



# Battling Herbicide Resistance

29%

of cropped  
land

24.5

million  
acres

estimated cropped land on the prairies infested  
with herbicide-resistant weeds

TOP HERBICIDE-RESISTANT WEEDS



Wild Oat

Green Foxtail

Broadleaf

Epigenetic  
alterations

- DNA Methylation
- Aromatic amino acids

Image from [www.decisivefarming.com](http://www.decisivefarming.com)

## Ian & Di Haggarty

45,000 acres

Sheep and

cropping

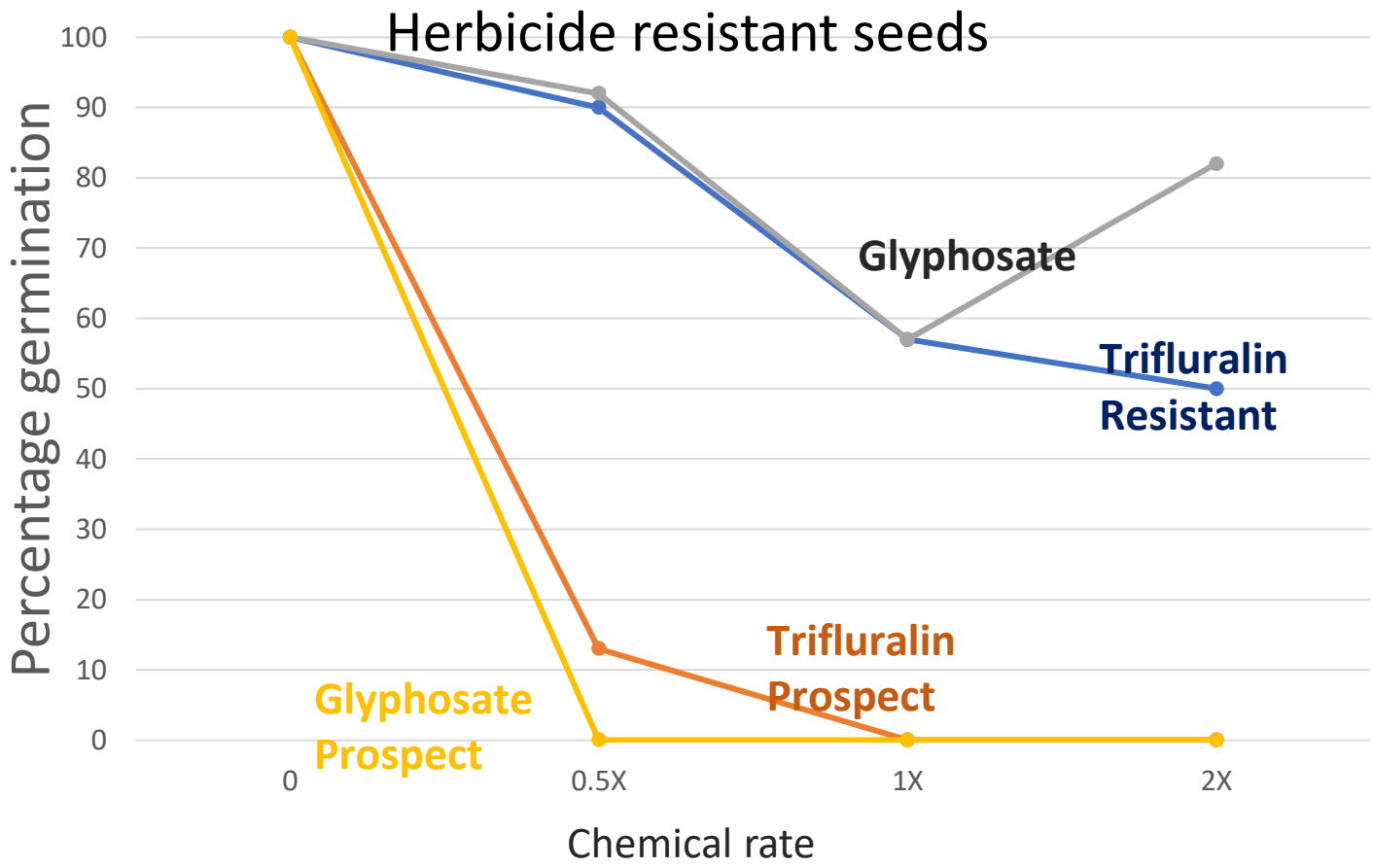
8 inches average

annual rainfall

- Post grazing- seed drilled with vermi-liquid, 5litres/ha
- In season 120 litres/ha compost extract







Herbicide resistant seeds

Glyphosate

Trifluralin  
Resistant

Glyphosate  
Prospect

Trifluralin  
Prospect

0

0.5X

1X

2X

Chemical rate

# WEED EXTRACT TEA

- 5-25# raw weed/ac
- Take fresh green plant materials (from one species) fill a large container and put a heavy weight on top to squish it. No need to add water.
- Contains concentrated minerals, pathogens and allopathic compounds
- Use as a spot spray ...dilute 1:10



# Weed extract

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- Bindweed extract dumped as a concentrate
- High in plant growth enzymes



Now you can read what your 'weeds'  
are trying to tell you, take your eye  
off the weed and focus on what you  
want to grow!

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