# Mechanical Weed Management

Chuck Mohler
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## Some basic principles of mechanical weed control

- In-row weeding is essential!
- Cultivator rows = planter rows (or some nice fraction)
  - Exceptions – tine weeders & rotary hoes
- Cultivator must be appropriate for the growth stage of the weeds and crop
- Create and maintain a size difference between weeds and crop

## More principles

- When weeds are very dense, cultivators take out a smaller fraction of them
- Increase planting density to compensate for stand loss from in-row machines
  - Especially in small grains
- Good soil drainage helps a lot!
- Chop crop residue if you reduce tillage
- Create a dust mulch

## A row crop cultivator – 5 shanks

## Brillion high residue cultivator

## No inter-row weeds

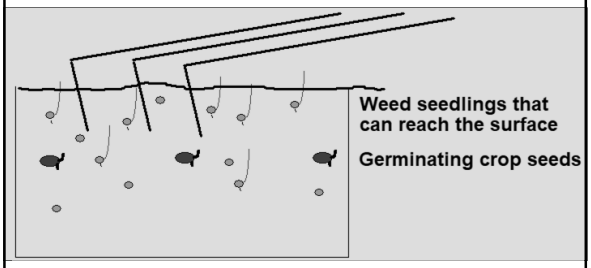
## How cultivators kill weeds

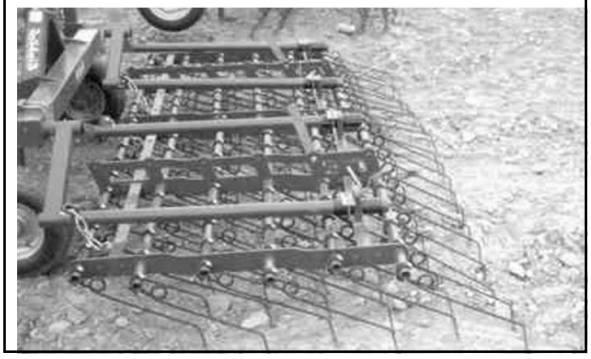
- Burial
- Dismemberment
  - Especially, severing root from shoot
- Desiccation – want to shake soil free from roots

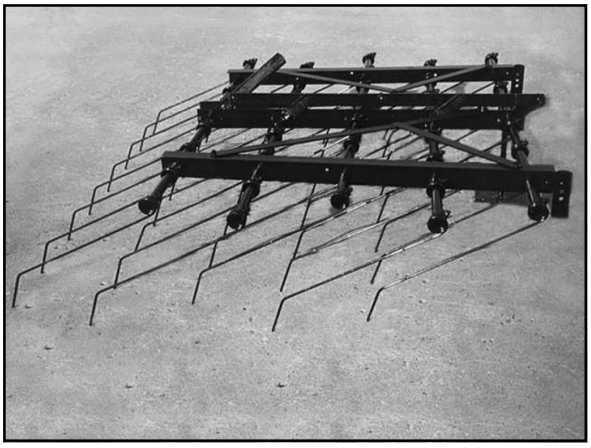
## Conditions determine what you want to do to the weeds

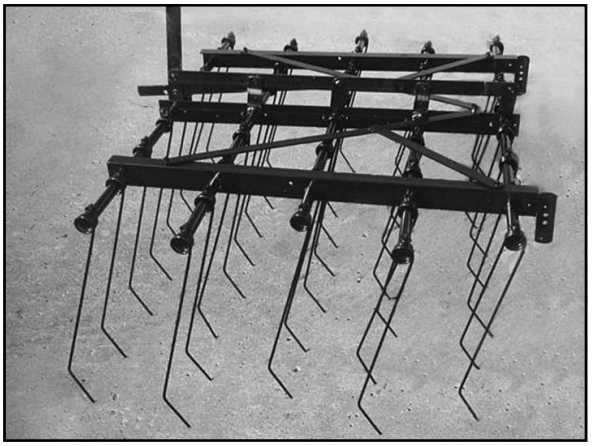
- Desiccation only works if soil is going to dry.
- If soil is moist, bury the weeds
- Cultivation close to a young crop row -- go for severing roots from shoots

## Clean out near-surface weeds without harming the crop







## Comparison of tine weeders

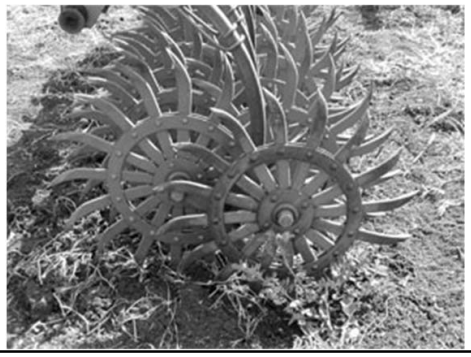
| Machine | Arm | "Tooth" | Diam. | Angle | Spacing | Mounting |
|---|---|---|---|---|---|---|
| Kovar | 15"<br>20"<br>20" | Straight<br>5"<br>3.5" | 5/16 or 1/4<br>5/16 or 1/4<br>1/4 | 0<br>45°<br>80° | ~ 1.5" | Chain |
| Einboch | | | | ~ 60 ° | 1" | Rigid |
| Rabewerk | 10.5" | 5" | 1/4 | 45 ° | 1" | Chain + |
| Lely | 15" | 4.5" | 3/16 | 75 ° | 1.6" | Rigid |

## Blind cultivation

## When to tine weed

- Corn – pre-emergence to about 8”
  - Avoid acute 60° to 80 ° tines, especially at spike to 2 leaf stage
- Soybean, beans – pre-emergence; seedling to 8”
  - Avoid crook stage!
- Barley, wheat, spelt – pre-emergence; 4 leaf to stem elongation
- Oat – pre-emergence; 2 leaf to stem elongation

## Rotary hoe



Minimum tillage rotary hoe

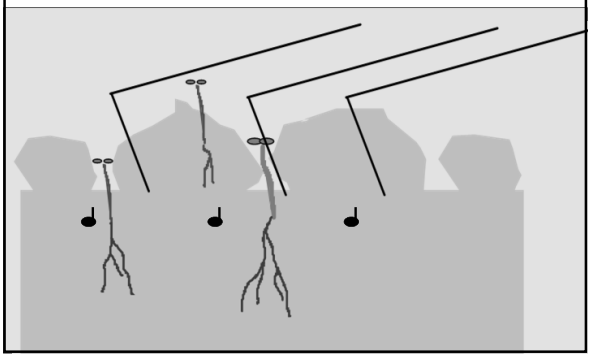
## Points about rotary hoeing

- Crop stages – similar to tine weeders
- Weeds must be tiny – small window of opportunity
- Great for breaking crusts
  - Break crusts with rotary hoe, then tine weed
- Gauge wheels
- High speed! – 9 to 12 mph

## Tilth matters for cultivation!

- Loose soil shakes off of roots better
- Good tilth allows more uniform coverage of weeds in the crop row

## Clods neutralize in-row tools.



## Machines for getting very close to or into the crop row

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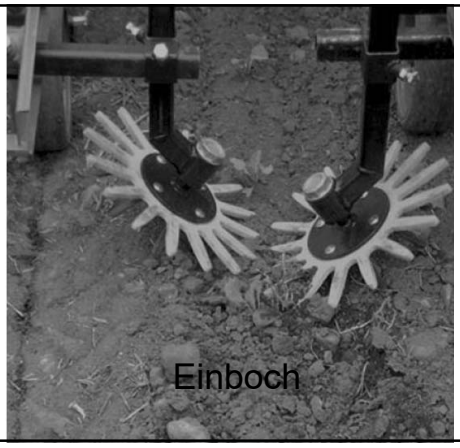
## Basket weeder

## Brush hoe

Brush weeder

Buddingh



Einboch

Torsion weeder

forward motion spreads tips

## In-row flaming

## Weeds after flaming

## Energy use

| System | What | Cal/A | % |
|---|---|---|---|
| Rotary hoe 2X + shovel cultivate 2X | Diesel only | 57,000 | 100 |
| Atrazine + Dual | Herbicide only | 69,000 | 122 |
| Roundup 1 qt/A | Herbicide only | 68,000 | 120 |

## Conclusions

- Start with a 45° tine weeder, and a good row-crop cultivator
- Having more tools around will allow a better job
  - and save the day in tough situations!
- Adjustments, adjustments, adjustments!
  - A hydraulic top link is a good investment
- For best results – take care of the soil!