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New optimized technique for mechanical control of *Elymus repens*

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Elymus repens (couch grass)

A problem in organic crop production.

Project aim and contents

- **Overall objective**:
- Knowledge on how to manage perennial weeds effectively by means of novel strategies and technology is available to organic farmers.
- ***Elymus repens (couch grass)***
- Technology for uprooting, exposing and destroying
  - Existing machines
  - Novel mechanical systems

Machines and implements used:

1. Tine cultivator (Marsk Stig Uniflex 8000)
2. Rotary tiller (Howard/Kongskilde Rotalabor)
3. Disk harrow (modified Dalbo – disks with spikes)
4. Tine cultivator and rotary tiller (Kvik-Up harrow)
5. Tine cultivator and rotary tiller (Kvik-Killer)
6. Beach cleaner (Beach-Tech 2800)

Reference machine

The spring loaded S-tine cultivator. A close up of the shape of the S-tines are displayed to the right (MARSK STIG Model 8).

Rotary tiller

Howard/Kongskilde Rotalabor

Disk harrow

modified Dalbo – disks with spikes

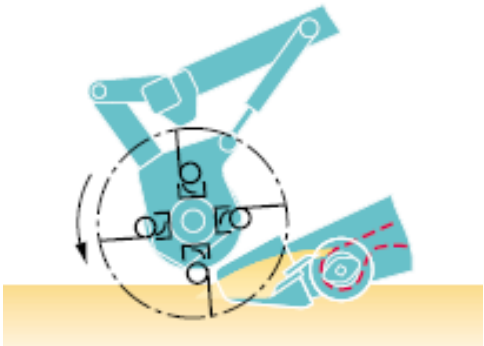
Rigid tine cultivator and rotary tiller

Kvik-Killer

Rigid tine cultivator and rotary tiller

Kvik-Up harrow

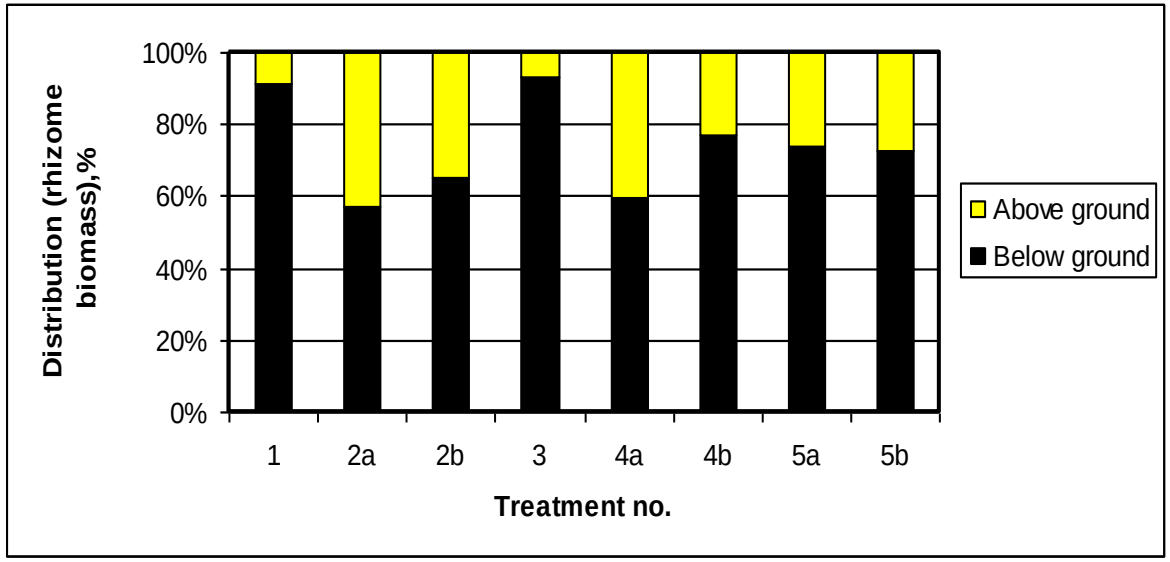
Beach cleaner
Beach-Tech 2800



Field experiments

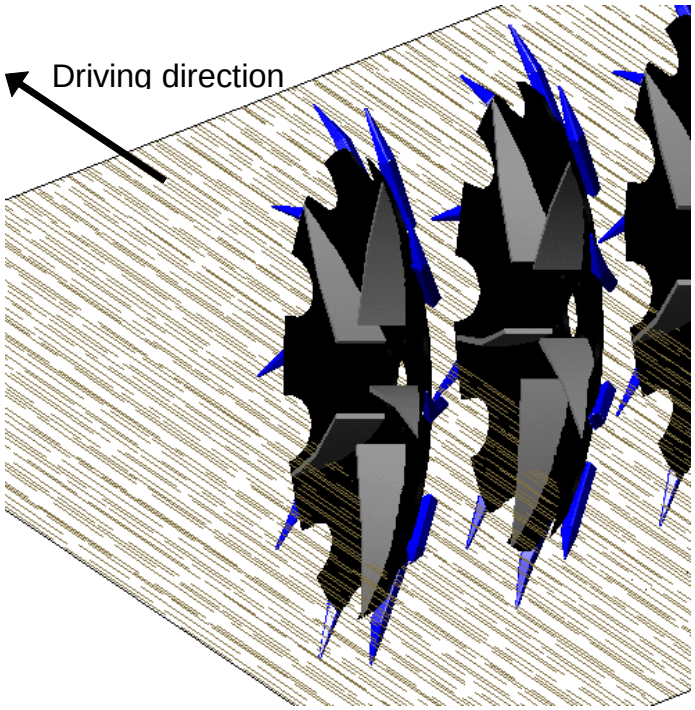
- *The amount of Elymus Repens rhizomes below and above soil surface was determined by collecting all rhizomes within 0.5 x 0.5 meter plots*

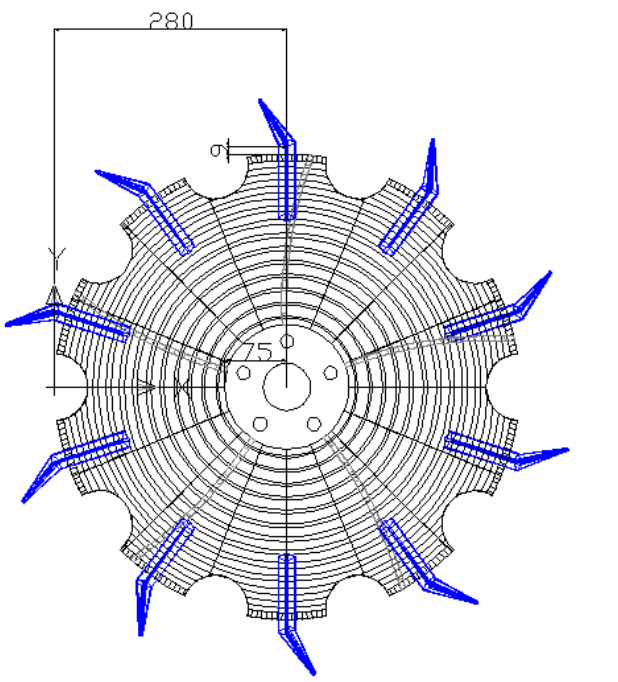
Relative distribution of rhizome biomass after treatments



- *1: tine cultivator,*
- *2a: rotary tiller (low forward speed),*
- *2b: rotary tiller (high forward speed),*
- *3: modified disk harrow,*
- *4a Kvik-Up (low forward speed),*
- *4b Kvik-Up (high forward speed),*
- *5a Kvik-Killer (low forward speed),*
- *5b Kvik-Killer (high forward speed)*

Spike tine disc for uprooting rhizomes





Spike tine disc for uprooting rhizomes

1) row of standard concave discs,

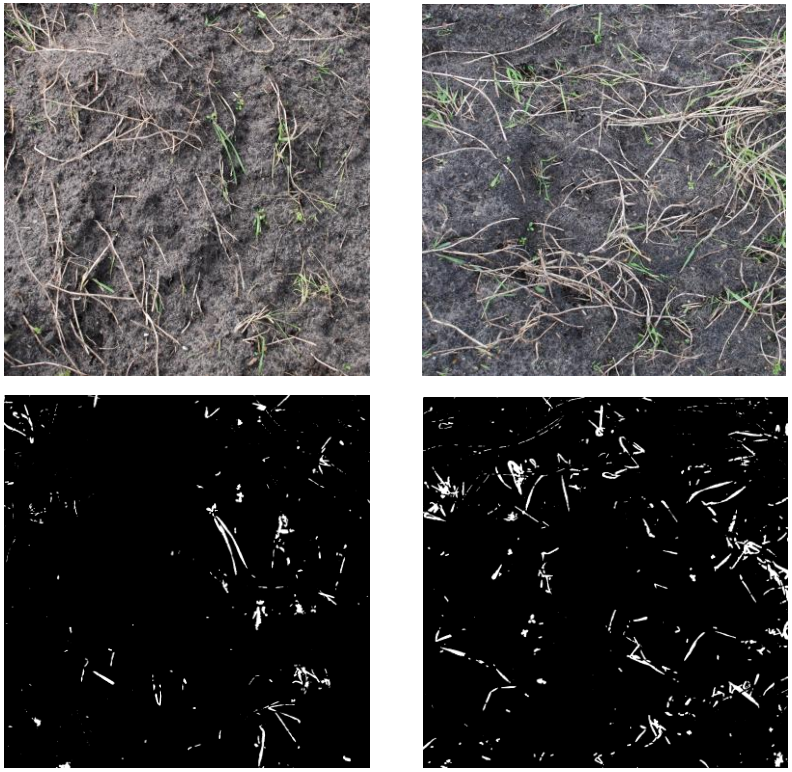
2) row of spike discs.

Uprooting and exposure results of field experiments

Treatment no.	Treatment/Machine	Rhizome uprooting and exposure ratio	
		Mean	(SD)
2.	Spring loaded S-tine cultivator	0.083	(0.030)
3.	Rigid tine cultivator with spike discs	0.064	(0.017)

LSD = 0.0209, Turkeys *t*-test.

Coverage of green weed material



- *Weed soil cover from treatment :*
- *To the left the rigid tine cultivator with spike discs*
- *To the right the spring loaded tine cultivator*

Coverage of green weed material

Treatment no.	Treatment/Machine	Weed soil cover	
		Mean	(SD)
2.	Spring loaded S-tine cultivator	0,946	0,019
3.	Rigid tine cultivator with spike discs	0,979	0,007

Conclusion

- Difficult to achieve a high percentage of uprooting and exposure of *Elymus repens* rhizomes when using high capacity machines
- The new designed spike discs were not capable of uprooting more rhizomes than the standard spring loaded tine cultivator
- The spike discs showed a more uniform distribution of the rhizomes
- The spike discs provided significantly better coverage of leaves of *Elymus repens* and broad leaved weeds