



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





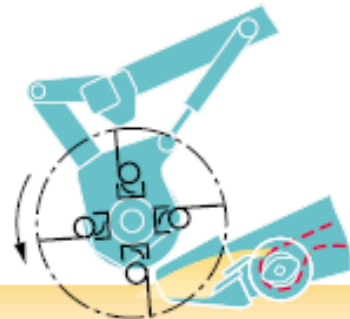
Rigid tine cultivator and rotary tiller Kvik-Up harrow





Beach cleaner

Beach-Tech 2800

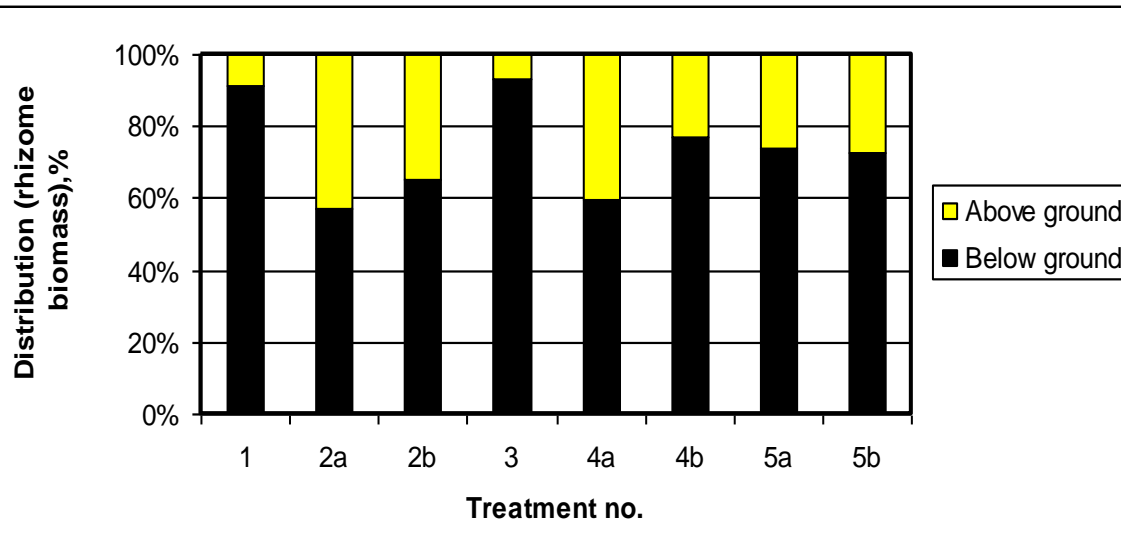


Field experiments



- › *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*

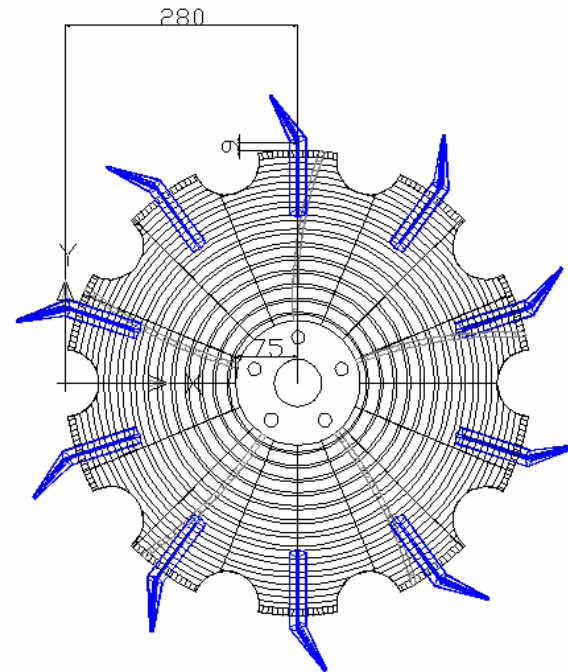
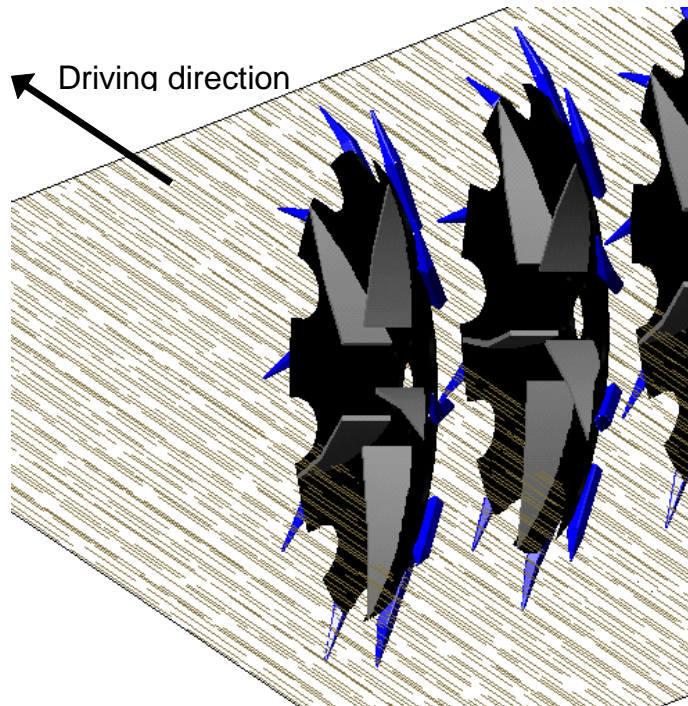
Relative distribution of rhizome biomass after treatments



- > 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.*

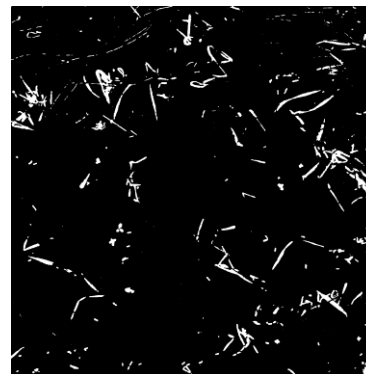
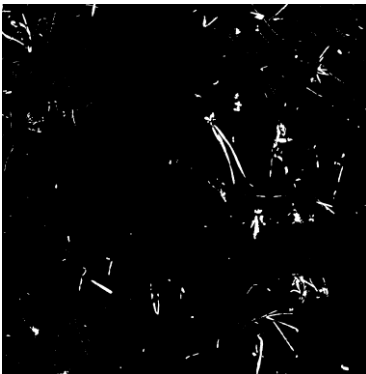


Uprooting and exposure results of field experiments

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