

Hiller (row cover) and clod remover (plough) on seeding machine

Variety: Norwich, field 880-0

Seed density: 131 seeds/m row (2,38 mil./ha)

Germination ability: 90%

Seeding day: April 23, 2020

The field is burned with a gas burner just before the germination of the carrots and hand weeded 6 weeks after sowing. Mechanical cleaning has been made between the rows.

Conclusions

1. It seems that the connecting or disconnecting the hillers (row covers) is a good tool for regulating the amount of soil pulled back over the seeds after the press wheel. Switching between non, one or two hillers turned down appears to be an easy way to control seeding depth and easier than raising and lowering both the hillers gradually in the suspension.
2. When sown immediately before rain, the press wheel is not decisive for the emergence. If there is no rain, conditions other than those described here in the experiment apply. Then the function of the press wheel is essential for safe emergence.
3. The seeding depth is very difficult to control when the plough in front of the front carry wheel is applied. The plough may be necessary to find moisture in very dry conditions, but it is not an optimal solution, because uneven depth gives uneven emergence. The front plough does not work very well.
4. The soil ridges that are left along the rows slides down again when it rains or with sand erosion and the seeding depth increases further. The ridges also cause problems when cultivation right after the germination of the carrots.
5. The front plough is disturbing in the soil and causing more weeds to germinate after sowing.

The row covers (hillers) are intended to push soil over the seeds after they are laid into the ground and pressed firmly by the rear wheel. But often it can be difficult to control the depth of the seed without pushing too much dry soil over the seeds. The seeding shoe should run at a depth so that the seeds are stuck in moist soil. Sometimes the moisture is so far down that more than 2 cm of soil is pushed aside. Therefore, it sometimes may make sense to use only one hiller or no hiller, so that the seeds are not covered with more than 1,5-2 cm of soil. Using the hillers in this way has the disadvantage that there will be more soil on one side when only one hiller is in use or that there is only a thin layer of soil in the middle when the shoe runs without hillers.

Another option might be to turn down the plough so that it pushes dry soil to the side before the seeding shoe goes into the ground. This will create less soil, which the shoe has to push to the side and also often less soil as the hillers have to pull back again. The plough has the disadvantage that when it pushes the soil to the side, it simultaneously lowers the entire seeding section, as front and rear wheels control the entire seeding section. In principle, it's going to be fine if the plough removes an equal amount of soil all the time. However, here is a big risk of it not doing so, thereby pushing more or less soil over the seeds and digging down the whole seeding section. If the plough is instead moved behind the front pressure roller, just in front of the shoe, than the shoe will run more stable at the same depth and the plough can push the soil so much to the side that the hillers do not get hold of the top soil again. In this experiment, we have used the traditional front plough in front of the front wheel. It goes fine with placing the seeds but a little too much soil is slipping back over the seeds and subsequent precipitation pushes additional soil over the seeds so that in practice they were placed at just over 3 cm's depth and at fluctuating depth.

If the seeds are to sit perfectly, they must be stuck in moist soil and firm bottom with good capillary effect, so that the soil itself draws moisture up to the seeds. This only succeeds if the press wheel runs perfectly. If it runs on stone or on a narrow edge at the sides, the seeds are not pressed firmly. The press wheel does not work if there is soil in narrow stripes on the smooth surface of the press wheel. Early in the morning, when the soil surface is damp, it may be tempting to raise the press wheels to avoid soil that clings as cement on the press wheels and which worn abrasors cannot remove. The argument is: "The soil is moist and the seeds are laid in moist soil". However, if the seeds are not stuck to solid soil with capillary effect, the seeds do not have contact to moisture. In this trial we have made plots without press wheel to demonstrate the consequence.

The sowing has been set to seed in 2 cm's depth. Then sown 20 metre long plots with two hillers turned down after the press wheels, one hiller or no hillers respectively. In the next plot the press wheel was lifted up and in the last plot the front plough was in use.

It was windy and dry the day that the trial was sown and the soil (humus-containing sandy soil) was very dusty. A few days after sowing, there was rainfall in a quantity sufficient to ensure good emergence regardless of sowing method. Therefore, there are not significant differences between experimental treatments and the germination. The seeding depth of the plot with front plough is the only one that stands out.

Germination of carrots and weeds 17 days after sowing

	Germination	Weed
	pl/m row	pr. m row
2 hillers	68	34
1 hiller	103	36
0 hiller	114	32
No press wheel	94	38
Plough (clod remover)	68	54

The seeding machine is set to seed at 2 cm depth with 2 hillers down.

Germination of carrots and weeds 26 days after sowing

	Fremspiring	Ukrudt
	pl/m rk	pr. m rk
2 hillers	100	46
1 hiller	116	56
0 hiller	121	48
No press wheel	115	58
Plough (clod remover)	92	63

The seeding machine is set to seed at 2 cm depth with 2 hillers down.

The more soil laid over the carrots the longer it takes to germinate. The plant number will also be slightly lower where the plough is used. The number of weeds does not appear to be significantly affected by the hillers, but the plough, which is moving more soil, does apparently also trigger more weeds.

Hillers, press wheel and clod remover on seeding machine

Treatment	Gross-yield	Small	+40mm	Medium
	ton/ha	%, weight percentage		
2 hillers	140	2,2	18	79
1 hiller	142	1,7	19	79
0 hiller	133	1,4	18	81
No press wheel	142	1,5	18	81
Plough (clod remover)	133	0,7	28	71

Gulerødder med fejl som grenede, fluer og rodfiltsvamp er ikk opgjort men ligger i gns på 5-10% og uden afgørende forskel mellem behandling.

There is no significant difference in yield between treatments. Only front plough may produce slightly lower yields due to uneven emergence. The same applies to the grading of roots. Only the plough differs by many oversize due to uneven emergence.

Plante number, press wheel og front plough on seeding machine

Treatment	Small	+40mm	Medium	Plante no.
	plants per meter row			
2 hillers	11	8	84	103
1 hiller	8	9	87	103
0 hiller	7	7	84	98
No press wheel	8	8	87	102
Plough (clod remover)	4	12	73	88

The plant number at harvest is somewhat affected due to the fact that large quantities of weeds have been cultivated and hand weeded. Cleaning and hand weeding help to even out the differences between experimental treatments. The average plant number at harvest is therefore close to 100 plants per meter row at all plots except in the plot with the front plough, where the plant number is still lower than for the other trial plots.

15-20% of plants appear to be lost in mechanical weeding and hand weeding !



2 hillers turned down to push soil in the row



1 hiller turned down to push soil into the row



0 hiller turned down to
push soil into the row



No press wheel



Front plough lowered down in front of the front wheel and sowing in 3 cm depth.

Front plough



Front plough lifted and not working.



Front plough lowered so that it presses into loose soil and pushes it to the sides before the front wheel.



Weight on the plough (sandbag) to ensure that the plough does not slide on top of the solid soil but pushes the soil to the sides at uniform depth. A primitive solution to a difficult practical problem.



The hillers that pushes the soil back over the seeds just after press wheel. When the plough is lowered, only part of the ground is pushed back. The hiller runs in the middle of soil ridge.



Result after seeding with the front plough lowered. Moist soil all the way to soil surface. But also ridges to the sides which slip back down when it rains and blows. The ridges on the sides also cause problems when cultivation weed in the organic carrots just after germination.

Hillers



1 hiller pulling soil back over the seeds.



2 hillers pulling soil back over the seeds.



0 hillers, where the rear wheel presses soil back into the row.



2 hillers pulling soil back over the seeds.

4. juni 2020. Weeds after cultivating.



2 hillers down to pull soil over the seed after the press wheel



1 hiller down



0 hiller



No press wheel



Front plough down in front of the front wheel and seeding in 3 cm's depth.

Weeds in the rows before cultivating



2 hillers



1 hiller



0 hiller



No press wheel



Front plough down

Lars Møller, 23.12.2020

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