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# Direct drilling

## Opinions of farmers and experts in the EU and Nebraska

*The trend to comprehensive globalisation also influences agriculture in Europe. For the sake of competitiveness this means that, with consideration of long term soil fertility and yield potential, sweeping rationalisations for decreasing production costs are necessary on farms. Although in Europe direct drilling currently plays only a minor role, despite available scientific trial results showing all-round positive influences on soil biosphere and farm incomes, the system is already practised on over 41 million ha in North and South America with the tendency increasing.*

Experiences and results concerning direct drilling (no-tillage) were reported on and discussed by scientists, advisers and farmers as part of an EU-financed concerted action (AIR 3-CT 93-1464, 1994-1998). The results are available as Proceedings I – IV and in a comprehensive databank on CD-ROM.

With the participation of six EU member countries and Switzerland in a survey, the experiences of a total 111 farmers who use direct drilling (around 53000 ha farmland) and the opinions of 176 „experts” from nine EU countries and Switzerland regarding direct seeding were recorded and processed.

As part of a research residency in Nebraska (NB) in the USA the opinions and experiences regarding direct drilling under the local conditions of 50 no-till farmers (with around 20000 ha farmland) and 18 experts were recorded.

From the comparison of the answers from farmers with an average 340 ha (14 to 646 ha) farm size who use direct drilling on 32% of the arable area (8 to 65%) with those of experts it was possible to determine at an EU level (fig. 1) that in the main, agronomic criteria were given as important arguments for using direct drilling. From the rated frequency it was apparent that very high positions were attributed to the savings effect regarding labour (98%), operational costs (98%), diesel fuel (86%), tractor performance de-

mand (79%) and the improved load carrying capacity of the soil (88%).

Motives that apply to effects relevant to the soil and environment play a notably less important role for the farmers with a rated frequency of 50% in each case for reduced soil erosion, higher biological activity, increase in earthworm populations, moisture retention, reduced nitrate transfer and higher infiltration performance. These motives were given substantially higher ratings by the experts, on the other hand, with rated frequencies of between 61% and 88%. With this, they lie at around the same level as the ranking of the agronomic motives by the experts whereby in each case the labour saving effect was placed first with a rated frequency of 97%.

In contrast to the EU farmers, the motivation structure of the surveyed no-till NB farmers was clearly more-strongly influenced by soil and environment relevant criteria such as water retention, soil structure improvement, reduced soil erosion, reduced nitrate transfer and higher humus content. The answers of the Nebraska experts regarding these themes are to a great extent identical with those of the local farmers and are similar to the main opinions of the EU experts. The motive of higher crop yields is a decisive criterium for using direct seeding for NB no-till farmers (rated frequency 93%) in contrast to both surveyed groups in the EU

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### Keywords

Survey, soil tillage, no-tillage, EC, Nebraska

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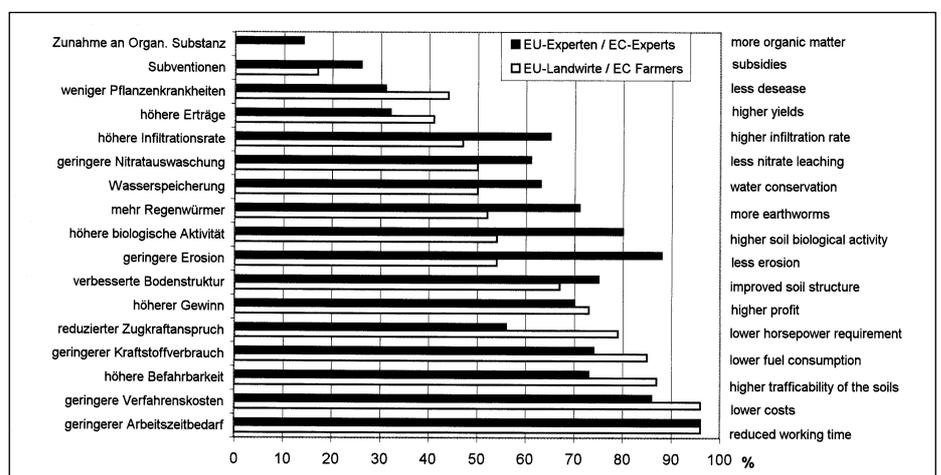


Fig. 1: Motivational structures of no-till farmers and experts within the EU

# CULTIVATION AND SOWING

Crop yield	F	E	F	E	F	E
	-	=	=	=	+	+
<b>Cereals</b>						
Rated frequency %	18,7	37,9	69,2	49,7	12,1	12,4
Crop yield %	12,9	11,2	+/-0	+/-0	12,4	10,7
<b>Maize</b>						
Rated frequency %	27,0	35,7	32,4	35,7	40,5	11,9
Crop yield %	20,7	14,7	+/-0	+/-0	19,6	13,2
<b>Oilseed rape</b>						
Rated frequency %	31,8	57,8	50,0	35,9	18,2	6,3
Crop yield %	13,9	13,3	+/-0	+/-0	13,3	13,3
<b>Pulses</b>						
Rated frequency %	16,2	30,8	65,2	46,0	16,7	23,1
Crop yield %	18,6	14,5	+/-0	+/-0	12,5	11,7
<b>Sugar beet</b>						
Rated frequency %	10,0	74,0	60,0	15,5	30,0	10,3
Crop yield %	13,9	17,2	+/-0	+/-0	10,0	11,0
<b>Total</b>						
Ø Rated frequency %	21,2	47,2	54,2	36,6	23,5	12,8
Ø Crop yield %	16,0	14,2	+/-0	+/-0	13,6	12,0

Table 1: Farmer (F) and expert (E) experiences regarding crop yield comparisons from no-till and conventional cultivations.

the experts, on the other hand, said that yields were about the same, 12.8% claimed a higher, and 47.2% a lower, level.

For individual crop performance 62% and 69% of the experts felt that direct drill cereal and pulse yields respectively were equal to and higher than those conventionally cultivated. In contrast, less yield for direct drilling versus conventional cultivations of around 17% was expected by 74% of the experts for sugar beet, a drop of 13% for rape and 15% for maize from 58%, respectively 36%, of the questioned experts.

When one compares the general yield estimates of the experts with European trial results from the literature along with the crop yields of the 20-year cultivation comparison trials at the Institute of Agricultural Engineering of the JLU-Gießen carried out under practical conditions on five pedologically-differing sites, one can ascertain that the experts' yield estimations under direct drilling conditions are more pessimistic and also oppose the majority of the experiences (77%) of the direct drilling farmers: Even with the crops which are regarded as less suitable for direct drilling such as sugar beet, 90% of the farmers expected yield to be the same or higher. With maize and rape this figure was 73% and 68% respectively.

Country	Arable land area <sup>1)</sup>	Arable area suitable for direct drilling	
	(1000 ha)	(%)	(1000 ha)
CH		49,0	
D	11805	37,1	4381
DK	2510	44,0	1104
E	13954	45,5	6349
F	18302	31,8	5820
GB	5949	17,8	1058
GR	2250	37,0	833
I	9030	22,5	2032
NL	899	26,3	236
P	2326	45,0	1047
Total EU	67025	34,1	22859
Nebraska (USA)	8000	75,0	6000

Table 2: Arable land suitable for no-tillage

<sup>1)</sup> Quelle: Statistical Office of the European Communities (ECSC-EC-EAEC, Brussels, Luxembourg, 1996)

as well for the NB experts (in each case rank 14 from 17).

## Crop inputs

Surveyed as to the alterations concerning inputs of fertiliser and different plant protection materials through direct drilling compared with conventional cultivations, the experiences or opinions deviated greatly from one another, especially concerning application of herbicide. Whereas the majority of direct drill farmers surveyed gave here an equal number of high and lower inputs, around 70% of all the experts were of the opinion that inputs increased.

The level for all other plant protection materials applied was registered as similar to conventional cultivations by 64% of all experts and 83% of all farmers. 78% of the experts and 75% of the farmers reckoned that NPK fertiliser application was similar.

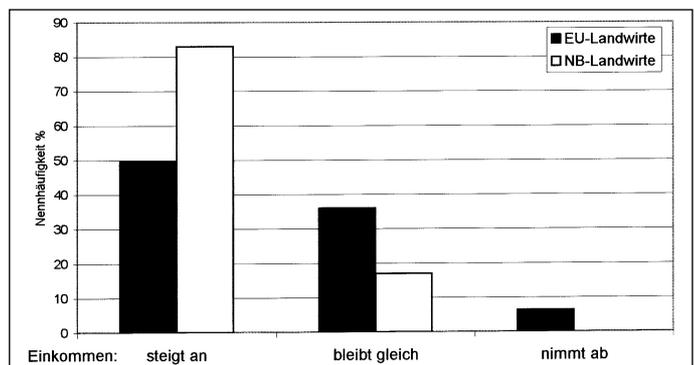
When one compares the EU farmer answers with those of the NB farmers there emerges a diametrical picture of herbicide usage. While 56% of the EU farmers reckoned application amounts were the same, 8% less and 36% higher, the answers from the US farmers showed different trends. Only

34% of them gave herbicide levels as the same, 6% as less and 57% registered a higher usage.

## Yields

Regarding the experiences and opinions on yield where direct drilling was practised (table 1), there were also clear deviations between the experts and the farmers. Whereas for 54.2% of the farmers, the yields, totalled over all the crops, were similar between the two systems, only 21.1% claimed less yield for long term application of direct drilling and 21.9% higher yields. 36.6% of

Fig. 2: Influence of no-till on long term farm profit (frequency %)



## Lack of acceptance

The survey answers regarding the still relatively small acceptance of direct drilling within practical agriculture indicated that the system users felt that the reason mainly lay with insufficient advice (73%), lack of experience (65%) and high capital costs for machinery (61%). With reducing rated frequency (56 to 50%), fear of reduced yields, weed problems, demands on management and insufficient cost analyses were given as reasons. With in each case 40%, insufficient scientific results and lack of drilling technology were given as arguments against uptake of the system. Less importance (32 to 23%) was awarded to the opinions of neighbours, the amount of plant disease and the landlord's attitude.

According to the experts, however, the grounds for the relatively small acceptance by farmers is in the main (93%) fear of reduced yields (see yield estimations by the experts). Other reasons given include the following of tradition and insufficient knowledge of the system with 88%, whilst the limited risk-taking willingness of farmers was rated at 85%. There then followed other reasons such as insufficient production cost analyses (76% of nominations) and high introductory costs (73%). In the middle were arranged insufficient technology (68%) and not enough scientific results (65%) and lack of economical necessity (62%).

From the NB expert's answers, the motivation structure had slightly different tendencies. Whilst here too, the major reasons lack of acceptance with an average rated frequency of 72% of no-till was tradition, fear of yield penalties, reduced risk-taking willingness and high capital investment in machinery, following closely in the middle range of the ratings were the reaction of the neighbours (67%) and landlord reaction (56%). With a share in each case of 44% were the grounds of no economic necessity and lack of analyses of production costs. In comparison, the motives of insufficient

scientific results and lack of appropriate technology played hardly any role in the relatively small acceptance according to EU expert opinion (68%) with a rated frequency of 33% and 22%.

**Effects of direct drilling**

Regarding the closing questions on the long-term effects of direct drilling on farm income (fig. 2), 49.5% of the surveyed direct drillers in the EU judged that this would increase, 36% saw income remaining at the same level and only 6.3% were of the opinion that the income would reduce in comparison with that for conventional cultivation. The NB farmers, with a notably longer experience of no-till, judged the influence of direct drilling application on farm income clearly more optimistically because 83% of those surveyed gave a higher income and 17% a similar income.

The questioning of the experts, who judged that 34% of arable land in Europe, around 23 m ha, was suitable for the application of direct drilling (USA-NB 75% of farmland = 6 m ha) (table 2), as to whether there would be increased use by farmers of the system if there was more targeted advi-

sory services available, greater availability of scientific results, financial support and/or suitable herbicide available, resulted in a negative answer from 23% of those surveyed. 72% of the 176 EU experts and 87% of the 50 NB experts are, on the other hand, of the opinion that with this sort of support, especially in the field of advisory services, there would be an increased application of direct drilling in agriculture.

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Bernhard A. Widmann, Freising

# Technical suitability of untreated vegetable oil as concrete parting agent

*With unadulterated cold-pressed rapeseed oil used as a parting agent similarly good results are possible with concrete as where a conventional mineral oil based agent is used. This is especially so with non-absorbent shuttering. The main requirement here is the application of an as thin and even as possible film on the shuttering skin in order to avoid faults on the concrete surface. The use of an airmix plant has proved suitable in this aspect although this is more usually utilised in the manufacture of pre-fabricated concrete parts in production halls with electricity and compressed air supplies than out on the building site. The system offers a special advantage with respect to the greatly improved operator protection.*

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**Keywords**

Vegetable oil, concrete parting agent, parting effect,