

**First Results of Investigations with Narrow Row Equal Space Planting of Corn for  
Silage**

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**Summary:**

The yield was increased by planting with narrow rows. To optimize this positive effect a standard corn planter was modified to plant in equal spaces. The attempts showed an increase of wet yield and dry matter yield and positive effects on evapotranspiration.

**Keywords:**

Planting, corn, silage, row-space, yield.

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### INTRODUCTION

To optimize corn production a lot of attempts have been made in last years. One of those was to plant corn in narrow rows with row widths between 300 to 500 mm. Higher wet yields and dry matter yields are ascertained. The Landwirtschaftskammer Rheinland- Pfalz (Germany) measured 6,4% more wet yield and 9,2% more dry yield of maize for silage, the level of corn was a bit higher. A farmer in Minnesota tried to grow corn with a row width of 15 inches (38 cm). He harvested 22 bushels per acre more in contest with the 75 cm- row. BURNS 1998 summarizes a higher starch yield in case of growing corn with smaller row widths and simultaneously with a higher plant population. REICHENBERGER 1999 reported higher yields, growing with 20 inches rows. But he sees another big advantage. The canopy of herds with smaller row width is earlier than other one. Thus there is less weed in the herds. Also the evapotranspiration is reduced.

Pioneer Hi- Bred grew up corn with a row width of 15 inches within different surroundings. In about 90% of the trials there was a higher yield of the 15 inch row compared to the 30 inch row.

If the corn is planted in equal spaces there should be a further increase of the positive effects on yield and evapotranspiration possible.

### MATERIAL AND METHOD

To get equal spaces between single plants corn has to be planted in equal triangle distribution (Figure 1).

Therefor a standard corn planter from Kverneland- Accord was modified (Figure 2). Based on the row with of 300 mm, the distance between two plants has to be 346 mm to get equal triangles, corresponding to a plant population of 96000 plants per hectare. The synchronization of the planter units was reached by a central drive and modified and adjusted seed wheels.

Recognizing former results of examinations on narrow row planting, the main points to investigate were the effects of narrow row equal space planting in comparison to traditional corn planting regarding

- the corn's bite and canopy
- the wet yield
- the dry matter yield
- the ingredients' concentrations and their yield
- the evapotranspiration

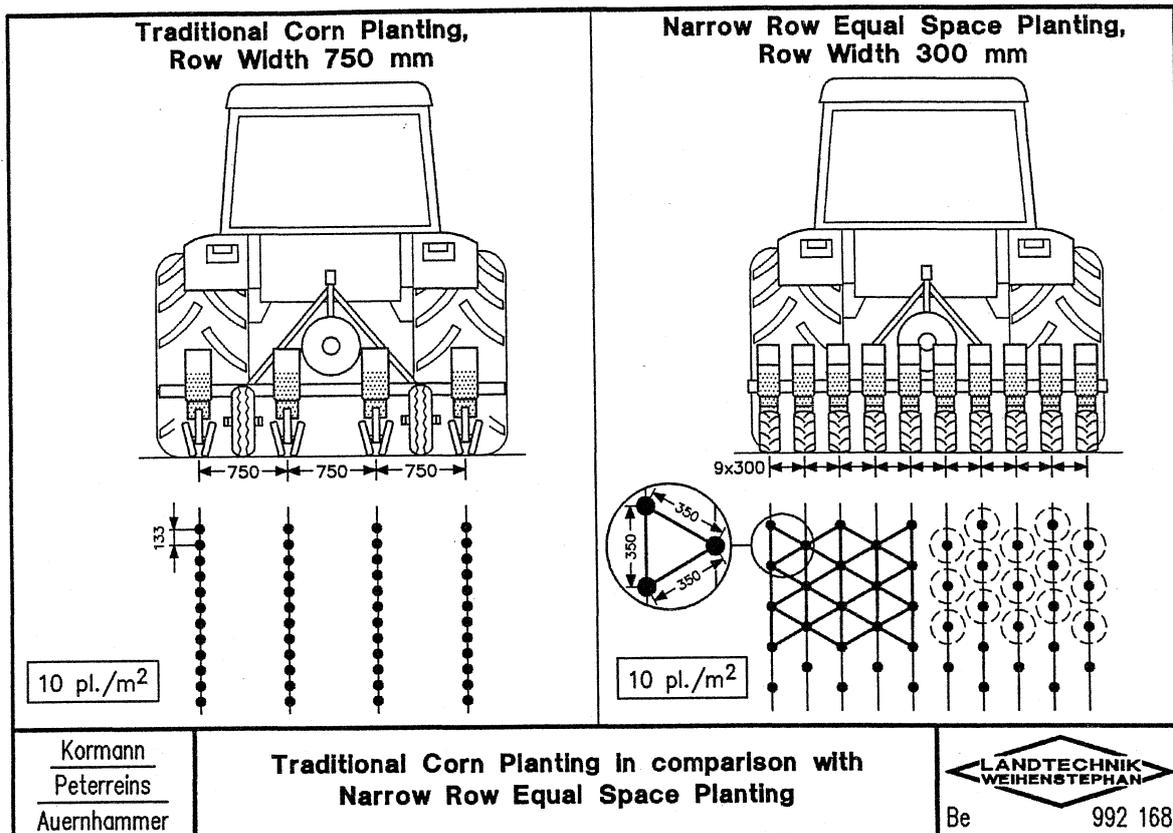


Figure 1: Traditional Corn Planting in Comparison with narrow row equal space planting



Figure 2: Used corn planter

The investigations should give an answer on these questions in dependency on three plant populations (80000, 100000 and 120000 plants per hectare) and three breeds (Major, Carrera, Prinz) at two different locations (Langenbach, Lb and Neuhausen, Nh). The following experimental plan was used (Figure 3).

	plant population 8 per m <sup>2</sup>						plant population 12 per m <sup>2</sup>						plant population 10 per m <sup>2</sup>					
	Prinz		Major		Carrera		Prinz		Major		Carrera		Prinz		Major		Carrera	
	ESP	TP	ESP	TP	ESP	TP	ESP	TP	ESP	TP	ESP	TP	ESP	TP	ESP	TP	ESP	TP
repetition 1	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m
repetition 2	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m
repetition 3	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m
repetition 4	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m
repetition 5	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m	9m	15m

ESP: Narrow Row Equal Space Planting  
 TP: Traditional Planting

Figure 3: Experimental plan

## RESULTS

The plots of narrow row equal space planting showed the expected equal triangle plant distribution (Figure 4).



Figure 4: Equal triangle distribution of narrow row equal space planting

Because the distance between the rows could not be varied, there was a little shifting of the angles at 80000 and 120000 plants per hectare.

The corn's bite was very different between the two kinds of planting. At mid of July the corn planted in equal spaces were about 3 cm higher than the others. In first quarter of August the differences between them grew up to 11 cm. The canopy of traditional planted followed one to two weeks after the narrow row equal space planted's one

The wet yield increased as a result of narrow row equal space planting (Figure 5 and 6). On average there was 2% more wet yield in Langenbach (57000 kg and 58000 kg per hectare) and 11% more in Neuhausen (50000 kg and 60000 kg per hectare). Major and Carrera reached more wet yield than Prinz. But all three breeds showed a positive reaction of planting with equal spaces, with the exception of Prinz in Langenbach (Figure 5). The plant populations have not influenced this increase of wet yield, but the narrow row equal planting gave a more constant level than traditional corn planting.

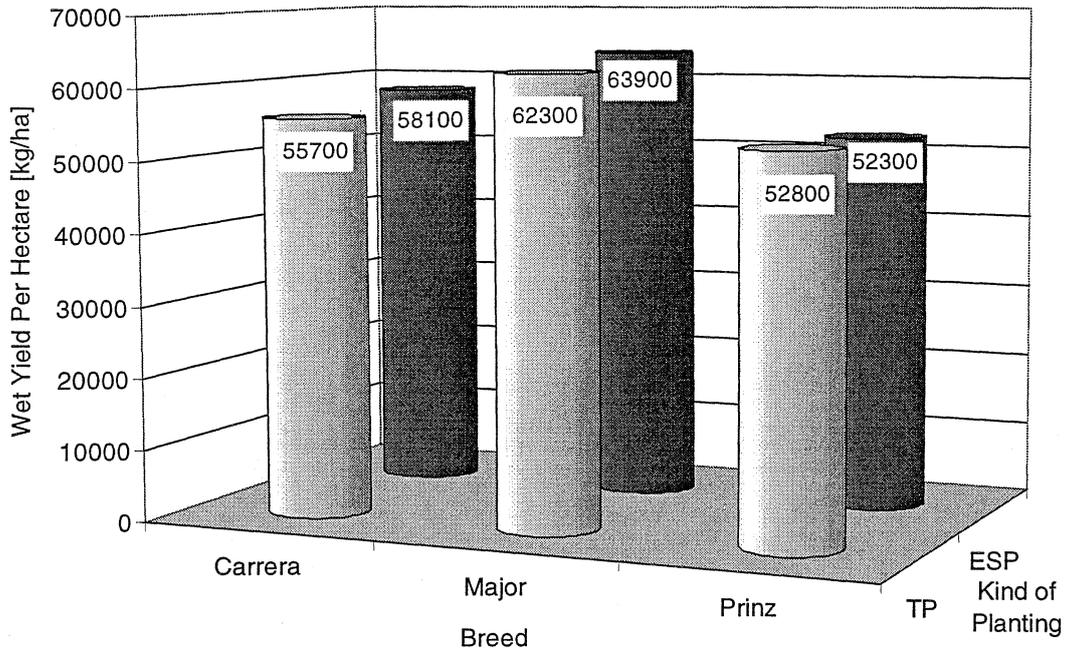


Figure 5: Wet yield per hectare in Langenbach

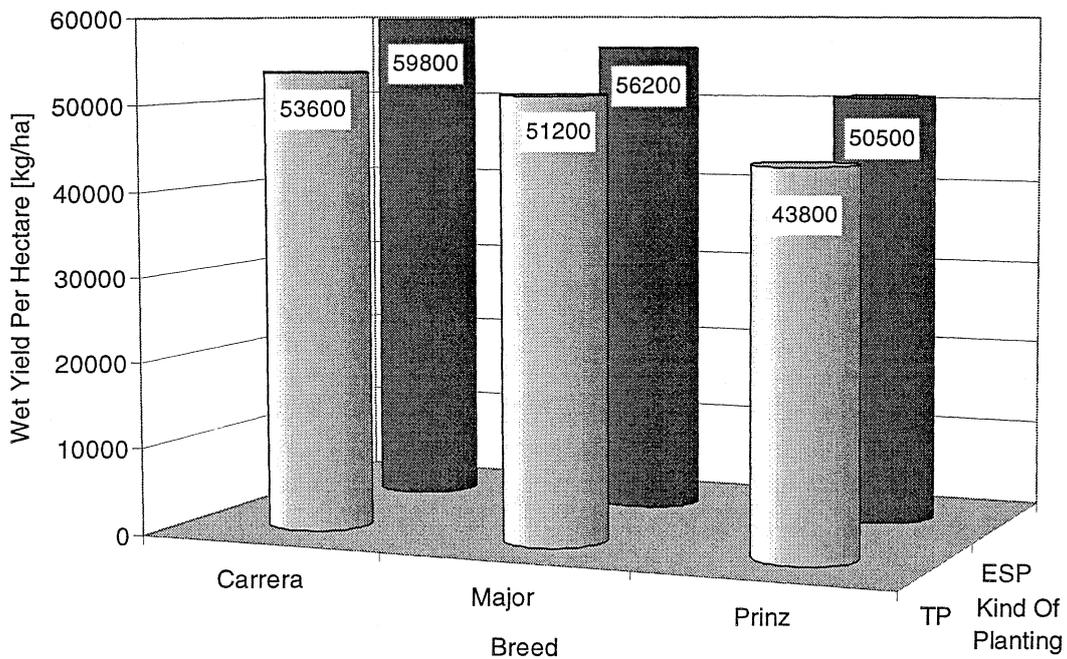


Figure 6: Wet yield per hectare in Neuhausen

The dry matter yield depended on wet yield and content of dry matter in wet yield. Prinz showed the highest content and so he had the largest increase of dry matter yield between traditional planting and narrow row equal space planting. The level of dry matter yield of all three breeds is quite similar (Figure 7).

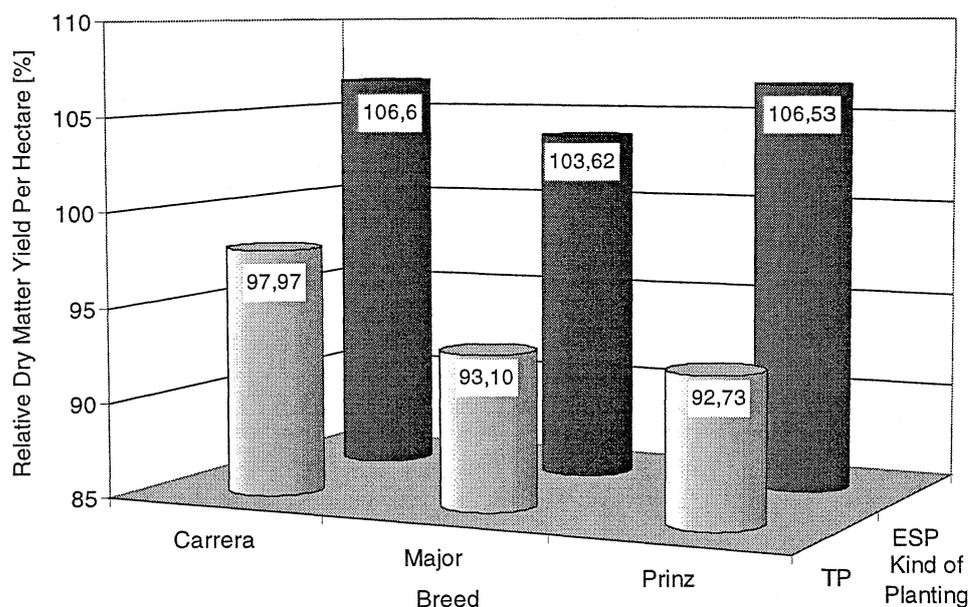


Figure 7: Relative dry matter yield per hectare in Neuhausen

Regarding to the content of the components in dry matter there was no clear influence by the kind of planting. In Neuhausen a higher content of crude protein and energy was noticed, in Langenbach a reversed situation could be seen.

Because of the faster canopy closing of narrow row equal space planting the evapotranspiration between the rows was smaller than in traditional planted corn. Within the row it was nearly equal.

The relative evapotranspiration depended on the plant population (Figure 8). At 80000 plants per hectare there was a higher level at the narrow row equal space planting (98,8% against 92,5%), at 120000 plants per hectare at the traditional planting (108,96% against 99,7%).

For a right interpretation it is necessary to take a look on the dry matter yield at these two plant populations.

At 80000 plants per hectare the plots of the narrow row equal space planting get 3% more yield than the plots of traditional corn planting. At 120000 plants per hectare the difference was about 5% (Figure 9). The use of the water is most effective on the plots with 120000 plants per hectare and narrow row equal space planting.

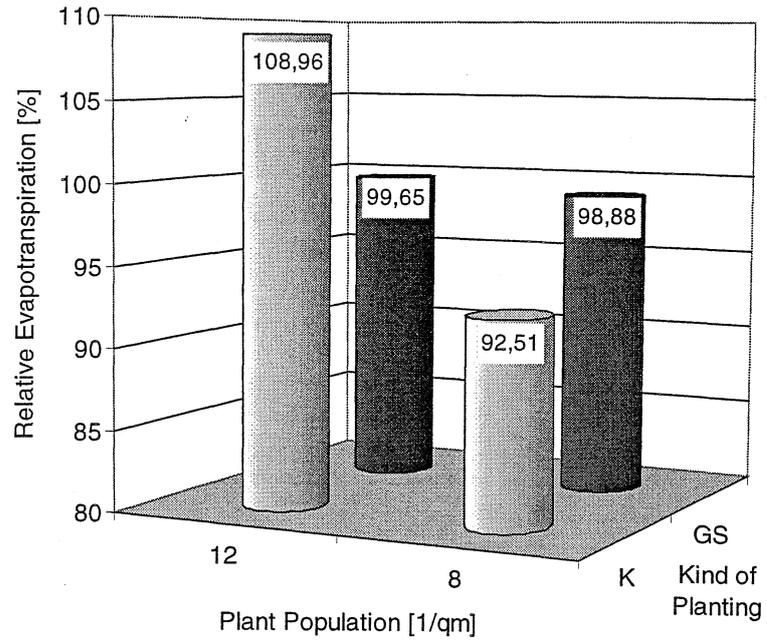


Figure 8: Relative evapotranspiration in Langenbach

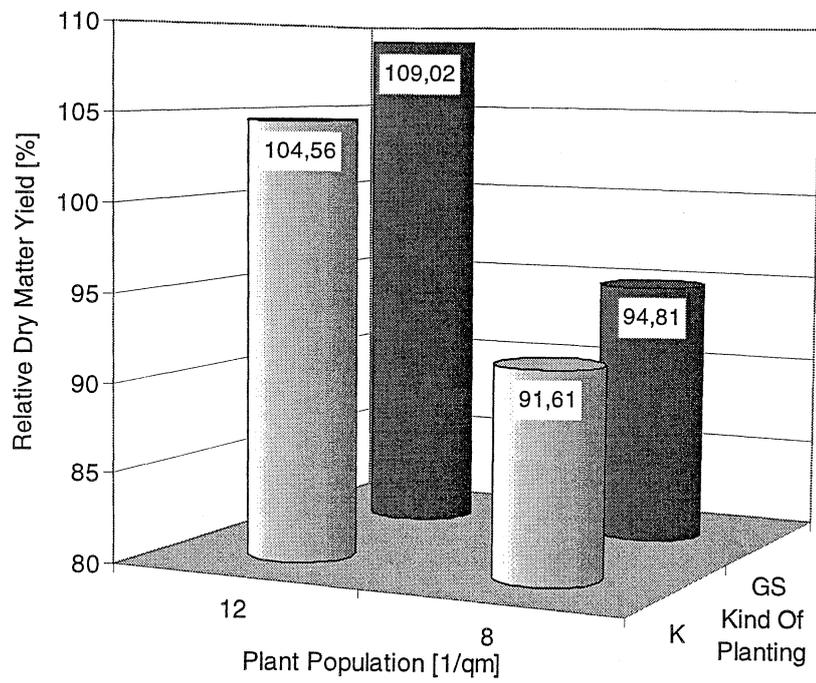


Figure 9: Relative dry matter yield in Langenbach

## CONCLUSIONS

The technical implementation of narrow row equal space planting with modified available equipment was very successful.

Narrow row equal space planting has shown a lot of advantages compared with traditional corn planting. First there were higher wet yield and dry matter yield for all tested breeds. There is no stabile result regarding the content of the ingredients.

Also the evaporation of this kind of planting is smaller, because of a quicker canopy closing.

## ACKNOWLEDGEMENTS

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The Institut für Pflanzenernährung made the investigations on evapotranspiration.

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