протравителем фунгицидно-инсектицидного действия Селест Топ 312,5 FS, т.к.с., 1,5 л/т в сочетании с микроудобрения Фентигрейн старт, 1 л/т.

2. На основе проведенных исследований в зоне правобережной Лесостепи Украины установлено, что обработка посевов пшеницы яровой фунгицидами и инсектицидами на IV и VIII э.о. повышает урожайность зерна и способствует улучшению посевных качеств и биологических свойств семян.

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UDK 635.655:631.55 *DOI 10.18286/1816-4501-2015-2-33-36*

EARLINESS EFFECTS ON HARVEST POINT AND YIELD OF SOYBEANS *(GLYCINE MAX)* IN NORTH-WEST GERMANY

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Key words: *vegetative development of soybean, earliness, yield and protein concentration in soybean.*

Examination of the effects of various earliness strategies on yield of soybeans

In 2011 and 2012 a field experiment was realized in Osnabrück, Northern Germany, to study the influence of different earliness strategies on the yield of soybean. This study was done in a randomized strip design with four repetitions, realizing two earliness strategies, dissolving film and fleece

cover, and additionally the control variant.

In both years it was possible to increase the germination rate of the plants. Besides, there were no statistically significant differences between the yield of the three variants. However, in 2012, differences between the protein concentrations could be detected. The protein concentrations of the variants which were realized with dissolving film and fleece cover, were significantly higher than those of the control variant.

Introduction

Because of climate change and the associated rise in temperature there is the possibility of cultivating soybean in Northern Germany [1]. Soybean ripens in such areas where also maize can be cultivated and the soil and temperature requirements of the soybean are generally similar [2]. One of the problems of cultivating soybean in Northern Germany consists in the slow juvenile development of the plants. In order to extend the possible vegetation period, the experiments with fleece cover and dissolving film were done. According to [3] a minimum germination temperature of the soil of 8-10°C is extremely important. The use of either dissolving film or fleece cover causes the advantage that the soil temperature rises earlier and faster.

In Germany, there is an increasing demand for high-protein and not genetically modified soybean for human consumption [4]. In order to satisfy this demand it is the goal of the project to expand soybean production in Northern Germany by examining earliness effects on soybean. Similar to maize, where dissolving film and fleece cover are used to accelerate the growth of the plants, soybean should ripen and be harvested earlier.

Materials and methods

The studies were realized in 2011 and 2012 at the experimental organic farm Waldhof (University of Applied Sciences Osnabrück) in a randomized strip design with four replications. In this experiment, the variety Gallec 000/00 was cultivated. Apart from the control variant, dissolving film as well as a fleece cover were used in order to accelerate the growth of the plants.

The three variants were investigated concerning germination rate and the yield of the different variants was measured.

Results and discussion

The application of dissolving film and fleece cover led to a tendency of earliness effects in the years 2011 as well as 2012. However, the control variant was able to catch up with the other variants due to the growth conditions. In 2011 the harvest of the variants with dissolving film and fleece cover was brought in a few days earlier than control. This effect could also be observed in 2012, where the control variant was ripe one week later than the other two variants, but in spite of this, the harvest had to be brought in at the same time due to the weather conditions. As it is shown in figure 1, in both years the yield of all the three variants was similar, but there could be noticed the tendency that the yield of the control variant was slightly lower.

Concerning the protein concentration, no statistically significant differences between the different variants in 2011 could be measured. In 2012 it is obvious that the protein concentration of the control variant was somewhat lower than that of the other variants. This might be caused by the fact that the soil of the control variant was less warm than the soil that was covered by dissolving film or fleece. Additionally, in 2012 the air temperature which was measured during the time of two weeks from May 1 to May 15 after the seeding was in average 1.5°C higher than the year before.

Table 1

Technical data in soybean production (2011 and 2012)

Technical data	2011	2012
Seedtime	27-04-2011	02-05-2012
Seeds per m²	65	70
Sowing depth	4cm	4cm
Row distances	37,5cm	37,5cm
Germination rate	7 days with fleece and film 12 days in control	9 days with fleece and film 16 days in control
Removal of the cover	05-05-2011 8 days after seedtime	18-05-2012 16 days after seedtime

The application of dissolving film and fleece cover in soybean shows an earliness effect and furthermore protects the plants from feeding damage.

There were no significant differences concerning the yield of the different variants, but in 2012 a difference in the protein concentration could be detected. This might be due to the fact that the average air temperature in 2012 was lower than one year before. These lower temperatures might have been the reason why the soybean profited from the application of dissolving film and fleece cover. In 2011 the average temperatures could have been high enough so that neither fleece cover nor dissolving film did have any earliness effects on the development of the plants.

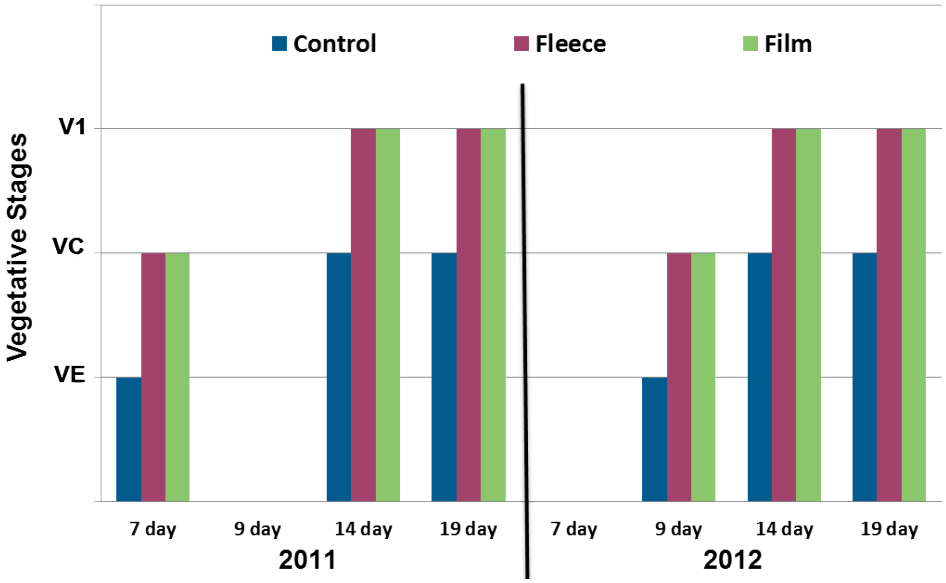

Fig. 1 - Vegetative stages in soybean production in Osnabrück, 2011 and 2012

(VE: emergence, VC: cotyledon stage, V1: first trifoliolate).

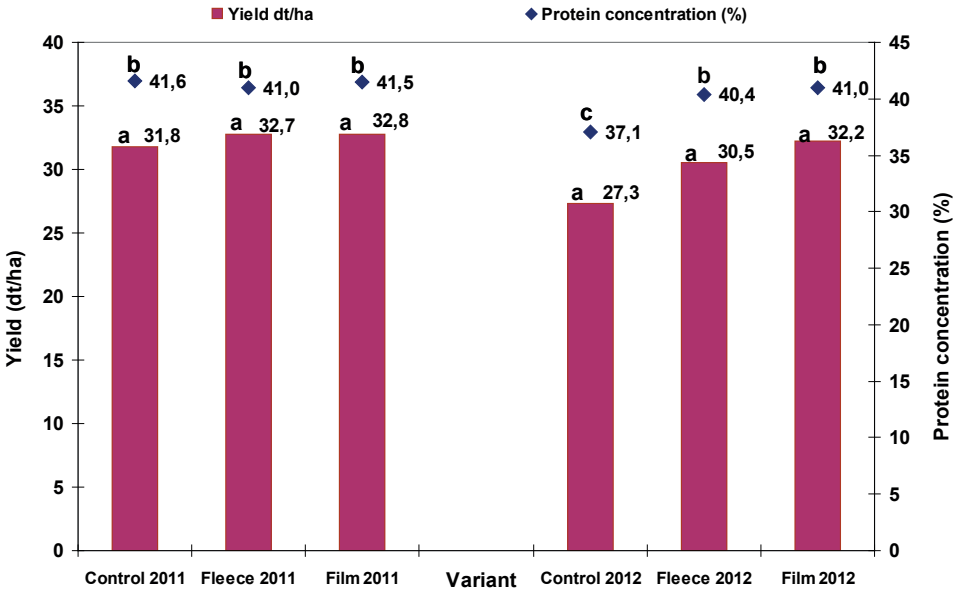

Fig. 2 - Yield and protein concentration in soybean of the cultivar Gallec.

Sponsorship

The experiments are sponsored by the project „Expansion of soybean cultivation in Germany through adaptation by breeding as well as optimization of crop production and processing technology“.

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Funds were granted by BÖLN

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