

## **Accelerated strawberry growing under perforated film and needled cloth**

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### ABSTRACT

Studies were carried out in the years 1999–2001 in Poznań. Three strawberry cultivars: ‘Elsanta’, ‘Honeoye’ and ‘Kent’, and 2 types of covers: perforated film and needled cloth were studied by accelerated growing method. Control combination consisted of plants grown without any covers. On the basis of commercial yield and wholesale prices in the successive harvest terms (according to Wielkopolska Agricultural and Horticultural Market in Poznań), the gross income for each growing method was calculated. Perforated film applied as a flat cover before winter in strawberry growing gave the best effect accelerating fruit ripening by 8-9 days in comparison with the control combination without covers. Needled cloth exerted a lesser effect on the acceleration of fruit ripening (1-5 days), but it resulted in the highest yield.

The highest gross income was obtained from ‘Kent’ and ‘Elsanta’ cultivars grown under perforated film cover, depending on the season and on the cultivar, reaching 2028–1116 PLN 100 m<sup>-2</sup>.

## INTRODUCTION

Strawberry growing under cover is widely developed in many European countries, and it brings considerable profits to the producers (Dijkstra and Rovers 1989). Poland has a high potential for the development of such a cultivation method, especially in Wielkopolska region, where plant vegetation starts naturally earlier than elsewhere in the country.

The objective of these studies was to evaluate the production effects of early strawberry cultivation under flat covers of perforated film and needled cloth.

## MATERIAL AND METHODS

Studies on strawberry (*Fragaria x ananassa*) were carried out in the years 1999–2001, at the Agricultural and Pomicultural Experimental Station in Przybroda near Poznań, on grey-brown podzolic soil. The experiment was established on September 1, 1999. After appropriate preparation of soil, its disinfection with Pyrethex,  $2.5 \text{ L} \cdot \text{ha}^{-1}$ , and the installation of sprinkling irrigation system, the field was mulched with agrofibre. Plants were planted in  $0.8 \times 0.25 \text{ m}$  spacing, 20 plants per plot, in 4 replications. Three strawberry cultivars were included in the experiment: 'Elsanta', 'Honeoye' and 'Kent', using three growing methods: under needled cloth cover ( $17 \text{ g m}^{-2}$ ), under perforated film cover ( $75 \text{ outlet m}^{-2}$ ), and control combination – without any cover. Every year in October, plants were covered for winter using either perforated film or needled cloth covers, depending on the experimental design. The covers were also used during nights in the blooming period.

In the successive vegetation seasons, basic prophylactic measures were applied against grey mould and grubs. The total and commercial yields were assessed after each harvest.

In order to evaluate the effects of harvest acceleration, gross income was calculated for the investigated cultivars on the basis of the commercial fruit yield (diameter  $>22 \text{ mm}$ ), and according to wholesale (Wielkopolska Agricultural and Horticultural Market in Poznań) fruit prices in the successive harvest terms. The results were statistically analysed using STAT software package. The significance of differences at  $p = 0.05$ , was calculated with Duncan's test.

## RESULTS AND DISCUSSION

The application of perforated film and needled cloth covers exerted a beneficial effect on the acceleration of vegetation start in the spring, as well as on plant blooming and fruit ripening. Fruit harvest of strawberry cultivars started each year at a slightly

different date, depending on weather conditions (Figs 1 and 2). Fruits of plants covered with perforated film were the first to ripen every year. In 2000, the first harvest of those fruits was carried out 8-9 days earlier than from control plants (Fig. 1), i.e. those left uncovered during winter. A lesser accelerating effect on the ripening of fruit was observed each year in plants under needled cloth cover. The first harvest of fruits from plots covered with needled cloth was carried out 3-9 days later than from plants covered with perforated film.

In the second year (2001), the first fruit harvests started much later, as late as May 19 for 'Honeoye' and May 25 for 'Kent' and 'Elsanta' cultivars (Fig. 2). Harvest of fruits from plants covered with needled cloth started 9 days later than from those under perforated film. Fruits in the control plots with the conventional cultivation system with no covers did not ripen before the first week of June. Thus, in the year 2001, the acceleration of fruit ripening in comparison with the control ranged from 7 to 11 days, depending on the cultivar and the weather conditions in that period (Fig. 2). Similar results were obtained by Ostrowska (1999), and by Szewczuk and Gudarowska (2000). In the earlier studies by Radajewska and Kowalski (1999), thanks to the application of perforated film cover, the ripening of fruits of the same cultivars was accelerated by 21-23 days. Kopylov (1991), depending on the type of the applied covers, obtained an acceleration of strawberry fruits of 'Krymczanka' and 'Redgauntlet' cultivars by 4-20 days. Gast and Pollard (1992) reported that the application of plant covers increased the mean soil temperature and its accumulation level in autumn and in spring. In result, in autumn, the plants continued their growth for a longer time, and in spring, they started their vegetation earlier. Plants under covers produced more buds and flowers and they gave a better yield. In the presented studies, the acceleration took place in early spring together with the start of vegetation and it was maintained or intensified, depending on weather conditions, until fruit harvest.

The specific weather conditions at that time caused the accelerated harvest of fruits under perforated film cover was almost completed, while the harvest from the control plants with no cover was only beginning.

High total yields of fruit were obtained in the first year of yielding, ranging from 89 to 202 kg 100 m<sup>-2</sup> (Table 1), whereas in the second year the yields were between 250 and 480 kg 100 m<sup>-2</sup>.

Each year, higher crops were obtained from 'Elsanta' and 'Kent' cultivars than from 'Honeoye' cultivar. Gross income showed slightly different trends each year, as commercial yields of fruit varied and each year the prices were different (Table 1). Better production effects were observed each year for plants covered with perforated film. In the year 2000 the highest gross income was obtained for fruits of 'Elsanta' and 'Kent' (1119 and 1116 PLN 100 m<sup>-2</sup>, respectively), whereas in 2001 – for fruits of 'Kent' cultivar (2028 PLN 100 m<sup>-2</sup>).

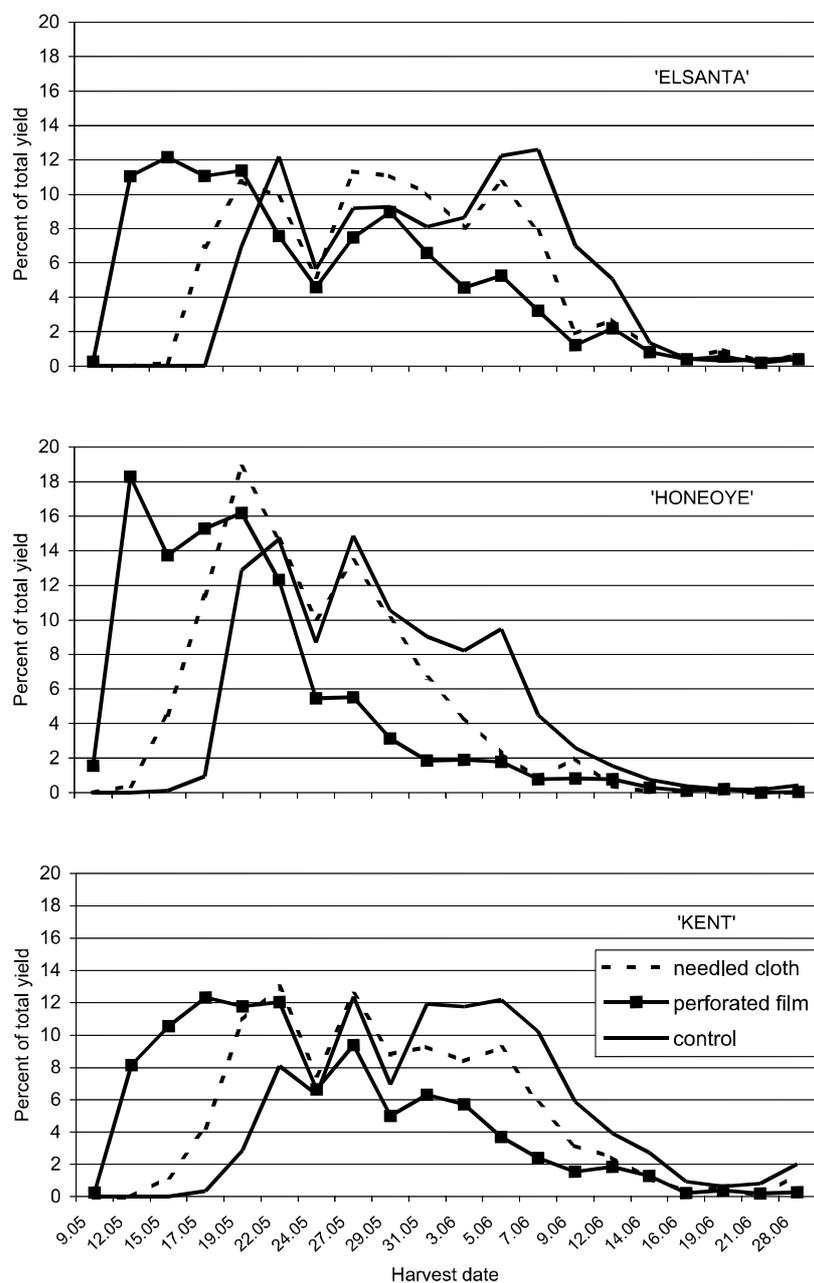


Fig. 1. Yielding dynamics of three strawberry cultivars under flat covers of perforated film and needed cloth in 2000

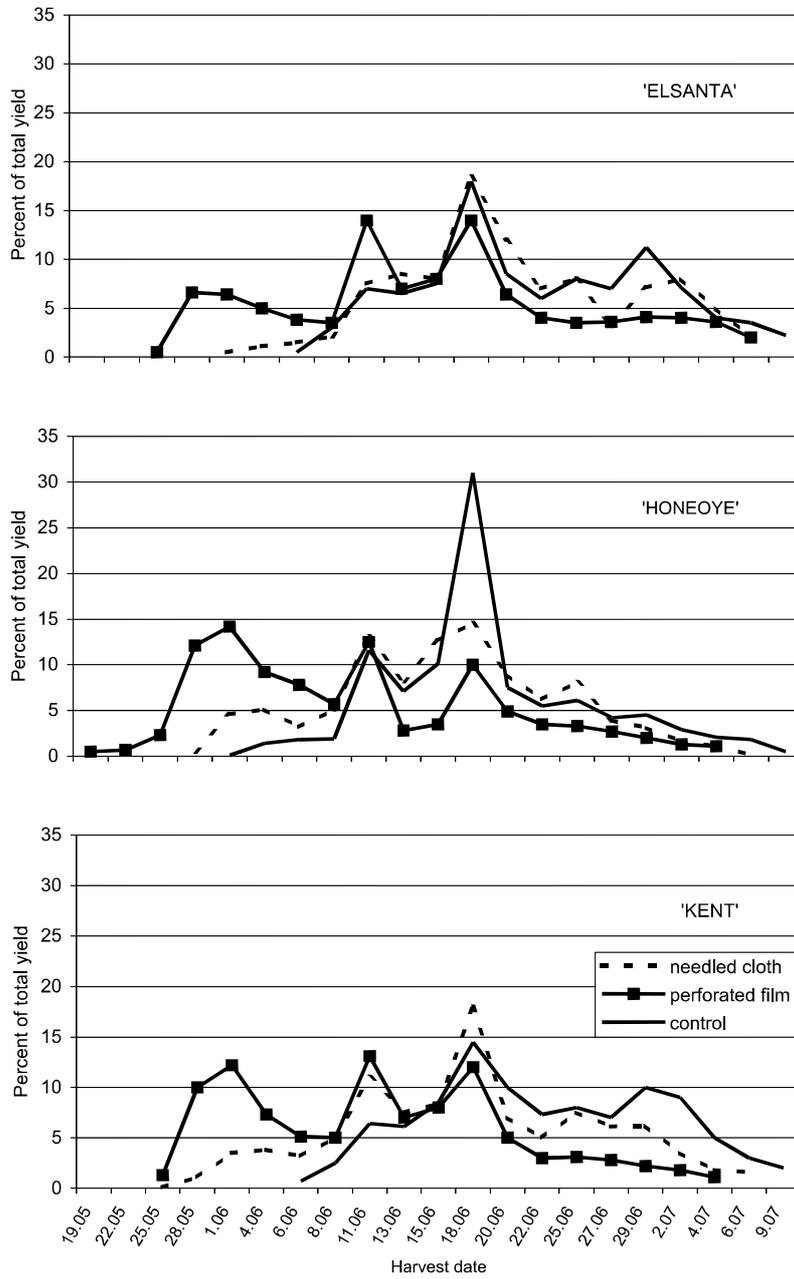


Fig. 2. Yielding dynamics of three strawberry cultivars under flat covers of perforated film and needed cloth in 2001

Table 1. Total and commercial yields of strawberries (kg 100 m<sup>-2</sup>) and gross income (PLN 100 m<sup>-2</sup>) in 2000 and 2001

Cultivar	Covering	2000			2001		
		Total yield	Com. yield	Gross income	Total yield	Com. yield	Gross income
'Elsanta'	Needled cloth	202 b*	187 b	921	480 c	410 c	1077
	Perforated film	155 ab	139 ab	1119	360 abc	330 bc	1475
	Control	196 b	182 b	646	460 c	420 c	920
'Honeoye'	Needled cloth	97 a	83 a	544	310 ab	270 abc	1119
	Perforated film	89 a	80 a	803	250 a	230 ab	1477
	Control	100 a	88 a	409	270 ab	170 a	850
'Kent'	Needled cloth	181 b	166 b	828	460 c	410 c	1441
	Perforated film	148 ab	138 ab	1116	410 bc	370 bc	2028
	Control	177 b	166 b	614	460 c	400 c	952
Mean	Needled cloth	160 a	145 a	764	420 a	370 a	1212
	Perforated film	128 a	119 a	1013	340 a	310 a	1660
	Control	158 a	145 a	556	390 a	330 a	907

\* statistical analysis was performed separately for each year

## CONCLUSIONS

1. Perforated film used as a flat cover in the growing of strawberries gave the best result in fruit ripening acceleration.
2. Needled cloth cover exerted a lesser effect on the ripening of strawberry fruits, but the crop obtained in this combination was the highest.
3. The highest gross income was obtained with the accelerated growing of 'Kent' and 'Elsanta' cultivars under perforated film cover. It amounted from 2028 to 1116 PLN 100 m<sup>-2</sup> in dependence of cultivar and season.

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#### UPRAWA PRZYSPIESZONA TRUSKAWKI POD FOLIĄ PERFOROWANĄ I WŁÓKNINĄ

Streszczenie: Badania prowadzono w latach 1999-2001 w rejonie Poznania. Badano w uprawie przyspieszonej trzy odmiany truskawki: 'Elsanta', 'Honeoye' i 'Kent' i dwa rodzaje okryć: z włókniny i folii perforowanej. Kombinację kontrolną stanowiły rośliny nie okrywane. W oparciu o plon handlowy oraz hurtowe ceny owoców w kolejnych terminach zbioru, obliczono dochód brutto dla każdego sposobu uprawy. Folia perforowana zastosowana jako okrycie płaskie przed zimą w uprawie przyspieszonej truskawki, dała najwyższy efekt przyspieszenia dojrzewania owoców o 8-9 dni w stosunku do kombinacji kontrolnej, bez okrycia. Włóknina miała mniejszy wpływ na przyspieszenie dojrzewania owoców truskawki (1-5 dni), ale plon był najwyższy. Najwyższy dochód brutto uzyskano z uprawy przyspieszonej truskawki odmiany 'Kent' i 'Elsanta' pod okryciem z folii perforowanej, zależnie od sezonu i odmiany, od 2028-1116 PLN 100 m<sup>-2</sup>.

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