

# Continuous and discontinuous nectar secretion in some pear cultivars

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**Key words:** insect attraction, nectar production, pear

**Summary:** Hourly nectar secretion was studied in five pear cultivars between 1997–1999. Some cultivars (e.g. 'Csákvári téli') secreted nectar continuously during the whole day, offering both nectar and pollen for pollinating insects. Discontinuous secretion (e.g. cvs. 'Viki', 'Nyárig tartó 6/19') is less advantageous from the viewpoint of insect attraction. In some cases, however, discontinuity or continuity of nectar secretion varied even within a cultivar (e.g. 'Solymári cukor', 'Jó szürke') in different years.

## Introduction

Periodicity of floral nectar secretion has been described by several authors in various plant families. *Pesti* (1976) claimed that the periodical nectar secretion in Asteraceae species was of endogenous origin and it was characteristic for the subfamilies.

In the Rosaceae family the secretory rhythm of nectar secretion may differ even within a species. *Orosz-Kovács et al.* (1990), *Scheid-Nagy Tóth* (1991) and *Szabó-Mühlenkampff* (1994) described that the peaks of secretion at the apple cultivars studied appeared at regular 4-hour intervals. In apricot, sour cherry and sweet cherry cultivars *Orosz-Kovács et al.* (1995) and *Orosz-Kovács* (1996) have demonstrated that nectar production maxima occur every 6 hours in homogamic flowers, whereas in dichogamic flowers nectar production has a periodicity of 12 hours.

The process of nectar production in pear cultivars was studied by *Simidchiev* (1970). According to his studies, flowers in the majority of pear cultivars produced the most nectar between 8–10 o'clock, when the sugar content of nectar was the lowest. He found that the highest amount of nectar coincided with the lowest sugar content in all cultivars. He also observed that pear nectar contained the least sugar compared with other fruit species. He claimed that the amount of the secretory product depended on meteorological factors rather than on the age of the flower. Bees usually visited pear flowers between 9–17.30 and they collected mainly pollen because of the low sugar content of pear nectar.

*Péter* (1975) found that bees do not frequently visit pear flowers, partly because of their unpleasant odour and partly because of low nectar production.

## Material and methods

Five pear cultivars ('Csákvári téli', 'Jó szürke', 'Nyárig tartó 6/19', 'Solymári cukor' and 'Viki') have been studied between 1997–1999 at the Research Station for Fruitgrowing, Újfehértó. For nectar measurements nectar was drained hourly out of 15–20 numbered flowers. Quantity of nectar was determined by calibrated microcapillaries, refraction was measured by a hand refractometer. When evaluating results, hourly mean nectar production of all flowers and average refraction values were taken into consideration.

## Results and conclusions

In 1997 out of the three studied pear cultivars 'Solymári cukor' did not secrete any nectar at all. Cultivar 'Csákvári téli' (*Fig.1*) produced more or less secretory product during the whole course of the study, with a sharp peak at 12 o'clock. Nectar secretion ceased only at 17 and 18 o'clock. At 19 o'clock secretion began again. Concerning concentration, nectar produced in the flowers of cv. 'Csákvári téli' was attractive for bees, since dry matter content varied between 8–16.5%. Nectar produced in the flowers of cv. 'Viki' (*Fig.2*) was measurable from 9 to 11 o'clock, with a maximum at 10 o'clock. From 12 o'clock secretion was scarce or it ceased altogether. Nectar refraction showed low values (3–9.2%). Nectar in pear cultivars studied by *Szabó et al.* (2000) contained only glucose and fructose in most cases, sucrose could be rarely detected. Since bees do not perceive the secretory product as sweet if sucrose is less than 4% or the mixture of glucose and fructose is less than 8–9% (*Örösi*, 1968), pear nectar should contain at least 8–9% of sugar to be visited by bees.

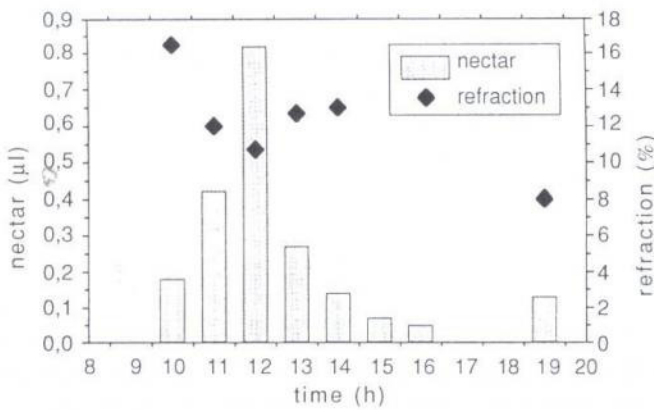


Figure 1 Hourly mean nectar production and its concentration in flowers of cv. 'Csákvári télei', 2 May 1997.

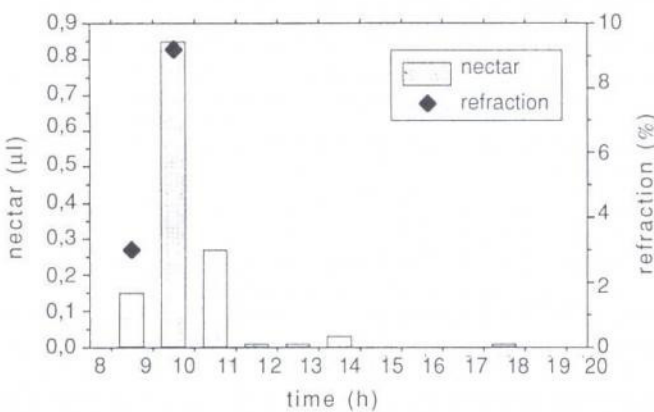


Figure 2 Hourly mean nectar production and its concentration in flowers of cv. 'Viki', 3 May 1997.

In 1998 cv. 'Solymári cukor' (Fig. 3) produced nectar continuously between 10–16 o'clock, in contrast with 1997, when no nectar could be measured in the flowers. Taking the average of all flowers, hourly nectar production varied between 0.12–0.39 µl. Concentration values increased from morning to evening, at 16 and 19 o'clock they reached 10–15%. The reason for significant differences between

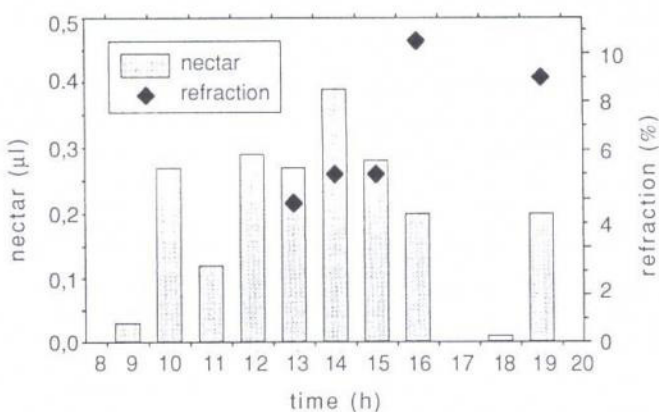


Figure 3 Hourly mean nectar production and its concentration in flowers of cv. 'Solymári cukor', 22 April 1998.

years have to be clarified by further studies. Pear cv. 'Nyárig tartó 6/19' (Fig. 4) produced little nectar in the afternoon hours, whereas two maxima could be observed at 10 and 14 o'clock, showing a 4-hour periodicity in nectar secretion. Nectar concentration approached the threshold level of bee visitation only at 15 o'clock, reaching 8%. Secretion only ceased at 12 and 16 o'clock in this cultivar. In 1998 a large amount of nectar (1.74–2.03 µl in the average of all flowers and 1.0–5.5 µl in the individual flowers) with very low values (1–6%) was produced in the flowers of cv. 'Jó szürke' (Fig. 5) in the morning hours (at 9, 10 and 11 o'clock). At noon and in the early afternoon nectar secretion ceased with the exception of 14 o'clock, starting again at 19 o'clock.

In 1999 flowers of cv. 'Jó szürke' (Fig. 6) produced the most nectar at 9, 10 and 11 o'clock, similarly to the previous year, but the maxima appeared at 9 and 11 o'clock, in contrast with the 10-o'clock maximum in 1998. The amount of nectar was lower than in 1998 (average values varying between 0.3–0.62 µl), but secretion was continuous and dry matter content was higher (6–13%).

Some of the studied pear cultivars (e.g. 'Viki' and 'Jó szürke') produced the highest amount of nectar with low concentration values in the morning hours, in accordance with the observations of Simidchiev (1970). In some cases,

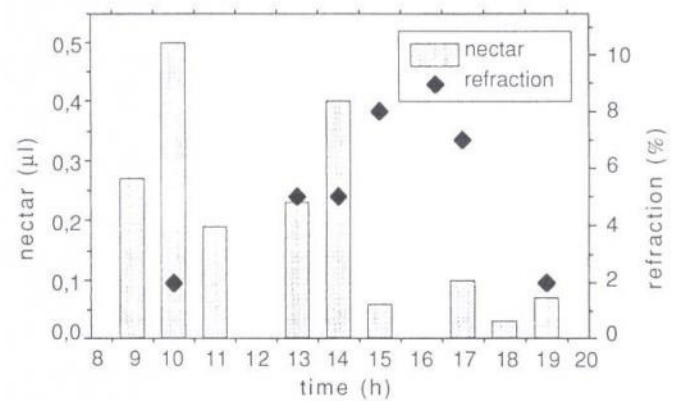


Figure 4 Hourly mean nectar production and its concentration in flowers of cv. 'Nyárig tartó 6/19', 24 April 1998.

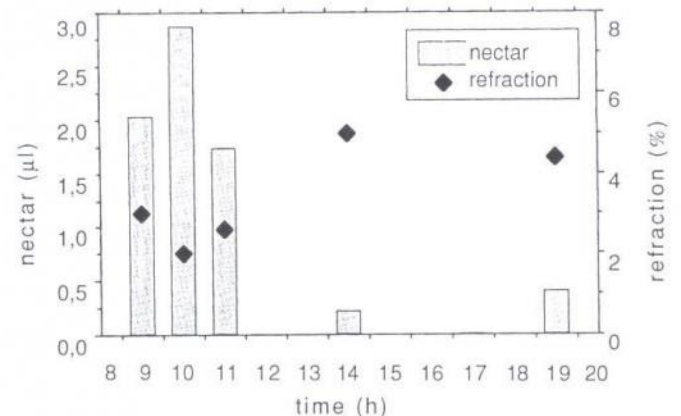


Figure 5 Hourly mean nectar production and its concentration in flowers of cv. 'Jó szürke', 24 April 1998.



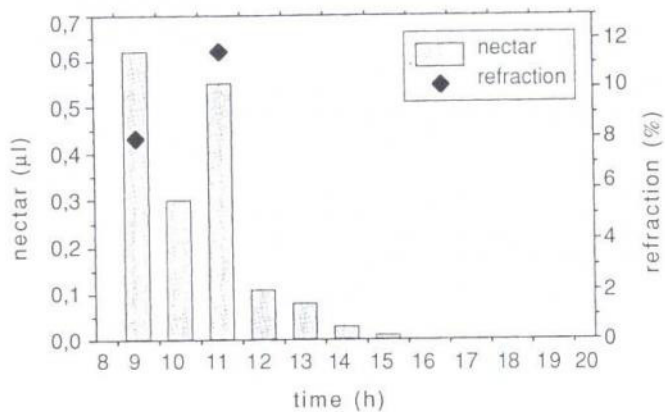


Figure 6 Hourly mean nectar production and its concentration in flowers of cv. 'Jó szürke', 20 April 1999.

however, discontinuity or continuity of nectar secretion varied even within a cultivar in different years. Cultivar 'Solymári cukor' produced no nectar at all in one of the years studied, whereas it offered, continuously, some secretory product for pollinator insects almost during the whole day. Nectar production of cv. 'Jó szürke' was discontinuous in one year and continuous in the other year.

From the viewpoint of insect attraction it can be advantageous if the flower is secreting during the whole day, as in cultivars 'Csákvári téli', 'Solymári cukor' in 1998 and 'Jó szürke' in 1999, always having a little nectar on the receptacle. In cultivars secreting discontinuously ('Viki', 'Nyárig tartó 6/19' and 'Jó szürke' in 1998) the small amount of nectar may evaporate in the breaks of secretion, and thus the flower can attract insects only by its pollen production.

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