

The effect of various chemical compounds in the control of sooty blotch

Marek Grabowski, Beata Wrona

Department of Plant Protection
Faculty of Horticulture, Agricultural University in Kraków
29 Listopada 54, 31-425 Kraków, Poland
e-mail mgrabowski@ogr.ar.krakow.pl

Key words: sooty blotch, spray program, primary infection, apple fruit

ABSTRACT

The date of primary infection by fungi causing sooty blotch varied depending on chemical protection programs. In unsprayed orchards the earliest infections occurred in late June - early July. By using the three fungicide sprays between the green flower bud stage and June drop (program I) the date of primary infection was postponed to the mid of July. The sprays prolonged by two weeks (program II) eliminated infection or considerably reduced the incidence of the disease. Among the three apple cultivars under investigation the highest susceptibility to sooty blotch was noted for 'Golden Delicious'.

INTRODUCTION

Sooty blotch belongs to diseases that more and more frequently occur in Polish apple orchards. The importance of this disease is steadily increasing from the time

when the tendency towards reduced application of chemical protection measures became clearly noticed. The disease primarily occurs in poorly sprayed orchards and in recent years it has developed more often also on cultivars resistant to scab (Grabowski 1999). Sooty blotch does not affect directly fruit yield, but highly deteriorates fruit quality, thus leading to considerable economic losses. Olive-grey spots may cover even up to 80% of the surface of the fruit (Williamson and Sutton 2000). Lesions occur mainly in the autumn. Infection occurs much earlier and the date of primary infection determines the disease progress (Brown and Sutton 1993, 1995). So far the disease created no significant hazard to commercial orchards, so there are no detailed studies dealing with this problem in Polish scientific literature.

The aim of this paper was to determine an effect of two different chemical protection programs on the date of primary infection and fruit infestation by fungi causing sooty blotch.

MATERIAL AND METHODS

The experiments were conducted at an orchard situated in the Jodłownik area near Gdów in the years 2000 – 2002 on cultivars: 'Jonagold', 'Golden Delicious', 'Cox Orange', in plots of two different chemical protection programs. The first program (I) included 3 treatments applied every year, i. e. in 2000: 22 April - Miedzian 50 (copper oxychloride) – 1.5 kg ha⁻¹, 19 May - Syllit 65 WP (dodine) – 1.5 kg ha⁻¹, 11 June - Dithane M-45 (dithianon) – 3.0 kg ha⁻¹, in 2001: 27 April - Miedzian 50 – 1.5 kg ha⁻¹, 20 May - Delan 700 WG (dithianon) – 0.5 kg ha⁻¹, 9 June - Rubigan 12 EC (fenarimol) – 3.0 l ha⁻¹, in 2002: 20 April - Miedzian 50 – 1.5 kg ha⁻¹, 23 May - Clarinet 200 SC (fluquinconazole, pyrimethanil) – 1.5 l ha⁻¹, 14 June - Syllit 65 WP – 1.5 kg ha⁻¹. In the second program (II), apart from the same protection as in program I, additional treatments were applied. They were as follows: in 2000: 20 June - Delan 700 WG – 0.5 kg ha⁻¹, 2.07 - Kaptan 50 WP (copper oxychloride) – 1.5 kg ha⁻¹, in 2001: 23 June - Syllit 50 WP (dodine) – 1.5 kg ha⁻¹, 5.07 - Dithane M-45 – 0.5 kg ha⁻¹, in 2002: 18 June - Kaptan 50 WP – 1.5 kg ha⁻¹, 1 July - Chorus 75 WG (cyprodinil) – 0.3 kg ha⁻¹. Untreated apple trees were used as control. To determine the date of primary infection 20 fruits were taken every two days from the mid of June to the mid of August from 15 trees of each cultivar in each combination. The fruits were kept separately in wet chambers. The date when first lesions were found on the fruits stored in chambers was considered as the date of primary infection in the orchard. The percentage of diseased fruits was derived from 100 ripe fruits taken for each cultivar in each combination.

RESULTS AND DISCUSSION

The research studies indicated that primary infection occurred primarily in orchard plots where no chemical protection treatments were carried out (control trees). In the year 2000 the symptoms of primary infection were found on untreated trees of 'Golden Delicious' on 27 June (Table 1).

Table 1. The effect of two chemical protection programs on the date of primary infection by fungi causing sooty blotch

Cultivar	Control	Program I		Program II	
	Date of infection	Date of infection	Date of last treatment	Date of infection	Date of last treatment
2000					
'Jonagold'	5.07	16.07	11.06	-	2.07
'Golden Delicious'	27.06	13.07	11.06	3.08	2.07
'Cox Orange'	2.07	12.07	11.06	7.08	2.07
2001					
'Jonagold'	4.07	17.07	9.06	-	5.07
'Golden Delicious'	26.06	11.07	9.06	4.08	5.07
'Cox Orange'	1.07	14.07	9.06	6.08	5.07
2002					
'Jonagold'	3.07	16.07	14.04	-	1.07
'Golden Delicious'	28.06	9.07	14.04	5.08	1.07
'Cox Orange'	2.07	12.07	14.04	8.08	1.07

The fruits of this cultivar sprayed with the tested compounds before June fruitlet drop (program I) become infected 16 days later (13 July). For program II the earliest primary infections occurred 37 days later than those of control combination. For the 'Cox Orange' young fruits on untreated trees became infected on 2 July, while primary infections on fungicide treated trees occurred 10 days later (program I) and 36 days later (program II). The latest date of primary infection was recorded for 'Jonagold'. On untreated trees the fruits became infected on 5 July, while after fungicide spraying before June drop (program I) this occurred 11 days later. The two additional treatments after June drop (program II) completely eliminated infection until harvest and no fruits having sooty blotch were recorded.

In 2001 the earliest primary infections were observed on untreated trees. Like in the previous year, the fruits of ‘Golden Delicious’ were infected earliest (22 June), while ‘Jonagold’ latest (4 July). In program I the first primary infections were found 15 days later than in the control for ‘Golden Delicious’ and 13 days later for ‘Cox Orange’ and ‘Jonagold’. The two additional treatments in program II caused the delay of infection by 36 days (‘Cox Orange’) or even 39 days (‘Golden Delicious’). For ‘Jonagold’ no symptoms of infection were found.

Similar results were also obtained in the last year of the experiments. No chemical protection led to the earliest and most intensive infestation of ‘Golden Delicious’. The percentage of infected fruits for this cultivar ranged from 27% to 28% in the years 2000 – 2001 (Figs 1 and 2). Other authors also reported a higher susceptibility to sooty blotch for ‘Golden Delicious’ (Rosenberger et al. 1997). A lower infestation was found for ‘Cox Orange’ (22-25%).

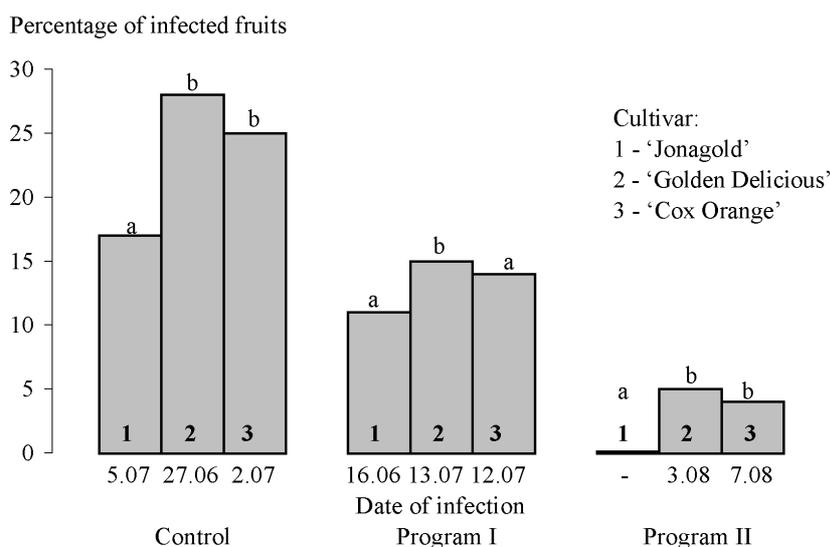


Figure 1. The effect of two chemical protection programs on infection of selected apple cultivars at harvest in 2000

The lowest infestation was observed for ‘Jonagold’ in all years of observations (Figs 1, 2 and 3). The three fungicide sprays (program I) between the green flower bud stage and June drop delayed primary infections by 10 – 16 days for all apple cultivars under examination. It resulted also in a reduced degree of infestation in comparison to control combination (unsprayed trees). In program II with the two additional fungicide sprays after June drop till the mid of July, infection was completely eliminated (‘Jonagold’) or reduced. Primary infection of the fruits was highly delayed by chemical protection. Typically, the earliest infections began one

month after the last chemical treatment was completed. Latham and Hollinsworth (1973), Main and Grutz (1988), Merwin et al. (1994) and Rosenberger et al. (1997) had also shown that fungicide spray applied before the mid of June delayed the date of primary infection even by 50 days, and most often completely protected the fruit against infection.

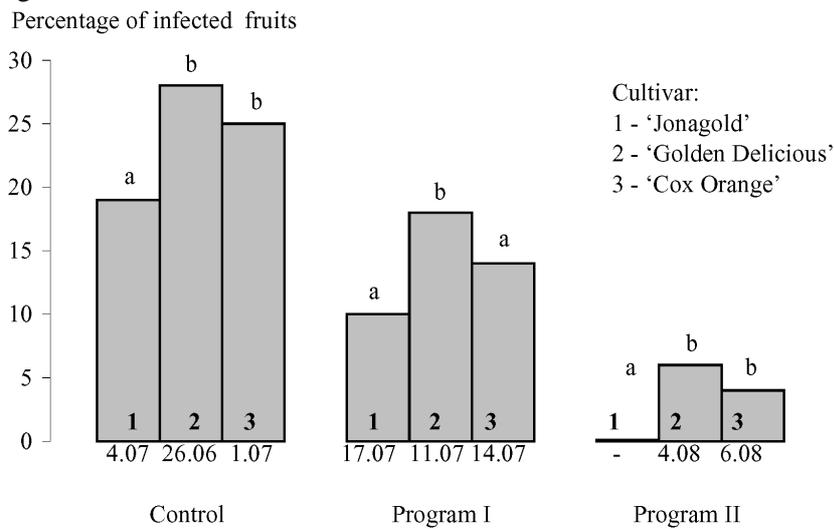


Figure 2. The effect of two chemical protection programs on infection of selected apple cultivars at harvest in 2001

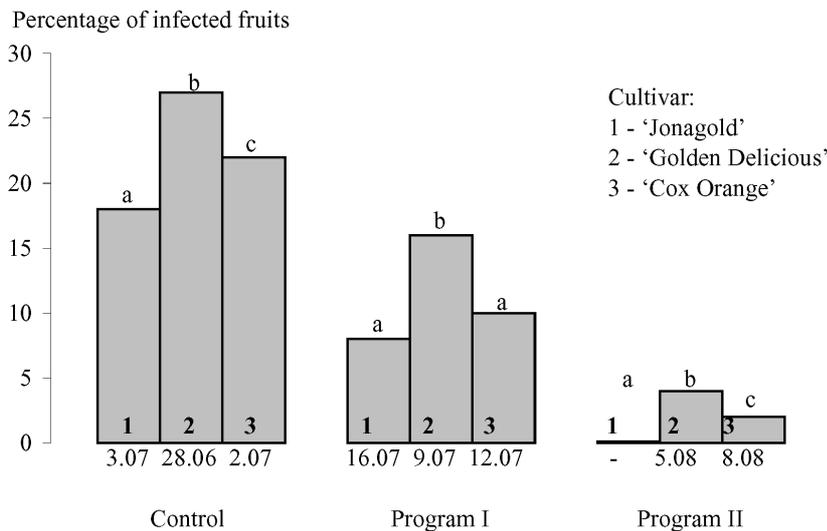


Figure 3. The effect of two chemical protection programs on infection of selected apple cultivars at harvest in 2002

REFERENCES

- BROWN E.M., SUTTON T.B., 1993. Time infection of *Gloedes pomigena* and *Schizothyrium pomi* on apple in North Carolina and potential control by an eradicant spray program. *Plant Dis.* 77: 451-455.
- BROWN E.M., SUTTON T.B., 1995. An empirical model for predicting the first symptoms of sooty blotch and flyspeck of apples. *Plant Dis.* 79: 1165-1172.
- GRABOWSKI M., 1999. Występowanie i szkodliwość brudnej i kropkowanej plamistości jabłek na wybranych odmianach odpornych na parcha jabłoni. [In:] *Ogólnopol. Nauk. Konf. Ochr. Rośl. Sadown. ISiK Skierniewice*: 219-220.
- LATHAM A.J., HOLLINSWORTH M.H., 1973. Incidence and control of sooty blotch and flyspeck on apples in Alabama. *Auburn Univ. Agric. Exp. St. Circ.*: 208-214.
- MAIN C.E., GRUTZ S.K., 1988. Estimates of crop losses in North Carolina due to plant diseases and nematodes. *N. C. State Univ. Dep. Plant Path. Spec. Publ.* 7: 40-51.
- MERWIN J.A., BROWN S.K., ROSENBERGER D.A., COOLEY D.R., BARKETT L.P., 1994. Scab resistant apples for the northeastern United States: New prospects and old problems. *Plant Dis.* 78: 4-10.
- ROSENBERGER D.A., MEYER F.W., ENGLE C.A., 1997. Timing summer fungicide sprays for sooty blotch and flyspeck. *1996 Fungic. Nematicide Tests* 52: 23.
- WILLIAMSON M.S., SUTTON T.B., 2000. Sooty blotch and flyspeck of apple: etiology, biology and control. *Plant Dis.* 84: 714-724.

WPLYW ZRÓŻNICOWANEJ OCHRONY CHEMICZNEJ NA TERMIN
INFEKCJI PIERWOTNEJ ORAZ PORAZENIE OWOCÓW PRZEZ BRUDNĄ
PLAMISTOŚĆ JABŁEK

Streszczenie: Termin infekcji pierwotnej grzybów wywołujących brudną plamistość jabłek był zróżnicowany w sadach o różnych programach ochrony chemicznej. W sadach niechronionych chemicznie do pierwszych zakażeń doszło na przełomie czerwca – lipca. Stosowanie trzech opryskiwań fungicydami od fazy zielonego pąka do czerwcowego opadania zawiązków (program I) powodowało wystąpienie infekcji pierwotnych w połowie lipca. Przedłużenie opryskiwań o dwa tygodnie (program II) powodowało uniemożliwienie zakażeń lub znaczne ograniczenie występowania choroby. Spośród trzech badanych odmian największą wrażliwość na występowanie brudnej plamistości jabłek wykazywała odmiana ‘Golden Delicious’.