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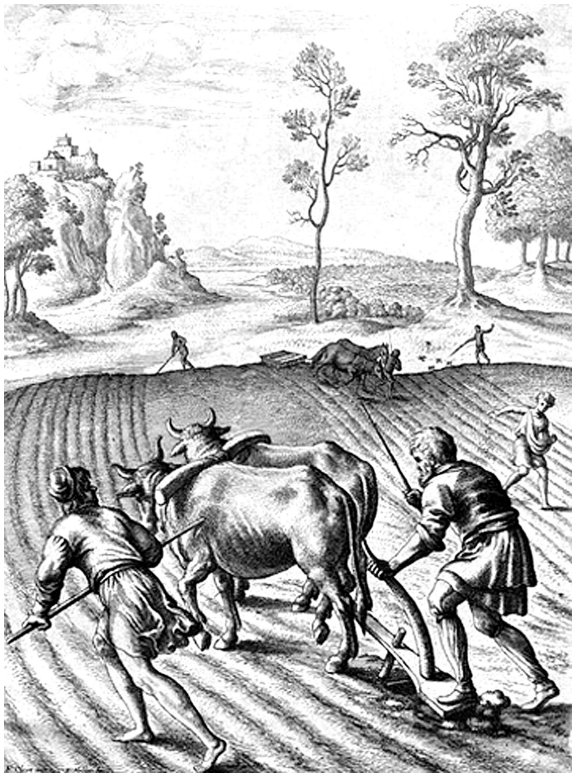

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The Effect of Different Planting Dates on the Extent of Bird Damage in Confection and Oilseed Sunflowers

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Abstract: The primary objective of this study was to determine the effect of different planting dates on the extent of bird damage in confection and oilseed sunflowers. The secondary objective was to determine the effects of genotype X planting date interaction on the bird damage. Field experiments were conducted at the Agricultural Research Institute of Kahramanmaras, Turkey. Two sunflower cultivars (*Helianthus annuus* L.), Pioneer 64A52 (hybrid-oilseed sunflower) and Inegöl (confection sunflower) were evaluated to bird damage in 8 different planting dates which were planned with the first on 25th March and others followed at about 10-day intervals. The trials were conducted using a randomized complete block, split-plot design with planting dates as main plots and cultivars as subplots. Results from this study indicated that planting date played an important role on the bird damage of sunflower. It was determined that there were significantly differences in bird damage among the planting dates. 5 and 15 April planting dates had the lowest bird damage in Inegöl (confection) sunflower. On the other hand, delaying planting until 5 June resulted in a significant increase in bird damage of P-64A52. Oilseed sunflower cultivar was highly preferred than confection sunflower by birds. Planting oilseed and confection sunflower cultivars at different planting dates have the potential to provide for decreased bird damage for sunflower producers.

Key words: Sunflower, planting date, bird damage

INTRODUCTION

Sunflower, due to the easy accessibility and high nutritional value of its seed, is particularly vulnerable to damage by birds. Sunflower seed is a preferred bird food because the seed contains many proteins and fats essential to their growth, molt, fat storage and weight maintenance processes. Significant losses occur in fields located near marshes and scrub[1].

There are several bird families that damage ripening sunflower in different countries. House Sparrows (*Passer domesticus* L.) causes major damage to commercial sunflower plantings in Kahramanmaras, Turkey. Generally, several cultural practices may be used to control birds. First, do not plant sunflowers next to cattail sloughs, marsh areas or woodlots because birds are likely to roost in such areas. Control weeds early to eliminate one food source from the field. Also, delay plowing the harvest stubble of other crops to provide an alternative feeding area for harassed birds. Mah[2] reported that bird-resistant hybrids should soon be available for use in high-risk depredation areas. The seed of these hybrids is protected by morphological traits such as concave-shaped heads, horizontally-oriented heads and long head-to-stem distance. Hybrids possessing the traits need to be planted in north-south rows to avoid overlapping of plants after flowering and subsequent sacrifice of bird-resistance characteristics. Cummings *et al.*[3] found that bird damage was 75% at 18 days after fertilization in sunflower. Birch *et al.*[4] reported that bird damage in sunflower plants might be decrease when seeds were harvested at the physiological maturity phase in which seeds contain about 35% moisture. Samancı[5] found that as planting was delayed in resistant cultivars, bird damage declined. He found no effect of planting dates on the bird damage in sensitive cultivars.

Seed yield of sunflower plant are limited by environmental conditions during the growing season. Protection of ripening sunflowers from bird damage and the relationship between morphological traits of sunflower and bird damage have been studied, but the effect of different planting dates on the extent of bird damage have not been fully studied[1-4]. In this study, confection and oilseed sunflower cultivars were included to test the possibility that genetic differences may affect the response to bird damage in different planting dates. The

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primary objective of this study was to determine the effect of different planting dates on the extent of bird damage in confection and oilseed sunflowers. The secondary objective was to determine the effects of genotype X planting date interaction on the bird damage.

MATERIALS AND METHODS

Two sunflower cultivars (*Helianthus annuus* L.), Pioneer 64A52 (hybrid-oilseed sunflower) and Inegöl (confection sunflower) were evaluated to bird damage in 8 different planting dates in 2001 at the Agricultural Research Institute of Kahramanmaras, Turkey. Kahramanmaras province is located in the East-Mediterranean region of Turkey between 37° 36′ north parallel and 46° 56′ east meridians. The studies were established on field of clay loam soil (pH, 7.5). The planting dates were 25 March, 5, 15 and 25 April, 5, 15 and 25 May and 5 June. Based on soil test conducted in test year, nitrogen, phosphor and potassium at the rate of 60 kg N, P_2O_5 and K_20 ha^{-1} were applied, respectively and remaining nitrogen (60 kg N ha^{-1}) was top dressed 35 days after planting (prior to first irrigation). Standard commercial practices for cultivation, weed control and pest management were used on all plots.

The trials were conducted using a randomized complete block, split-plot design with planting dates as main plots and cultivars as subplots. Each subplot consisted of 4 rows 7 m in length with 70 cm between rows and 35 cm hill spacing. Individual plots were spaced 2.8 m apart. Each treatment was replicated three times. The sunflower seeds were sown by putting three seeds to hills by hand. Post emergence, plants were thinned to one plant per hill 15 days after sowing. Seed yield were obtained from an area 1.4 m wide and 5 m long of the center 2 rows of each plot. Plants in the one row of the center two rows of each plot were protected by placing a cloth bag over the head after fertilization of the flowers. Fertilization of the flowers was indicated by withering and receding of the stigmas[6]. Heads of plants in the other row were not protected in order to determine the bird damage.

In the experiment, plants at the 8 different planting dates were harvested 142, 140, 138, 131, 129, 125, 123 and 120 days after planting, respectively. Average protected seed yield $head^{-1}$ (APSY), average unprotected seed yield $head^{-1}$ (AUPSY) and yield loss or bird damage $head^{-1}$ (BD) were investigated. Bird damage was calculated as: [(APSY – AUPSY) / APSY] x 100. Data were analyzed by the MSTAT-C statistical programme and LSD test was used to rank the means.

RESULTS AND DISCUSSION

Average protected seed yield (APSY): The APSY was significantly affected by the planting dates (Table 1). Early planted sunflower (25 March) yielded significantly more seed yield than the other plantings. APSY values for different planting dates were 102.29, 88.25, 86.27, 79.69, 58.41, 71.80, 77.31 and 87.87 g $head^{-1}$, respectively. 25 March planting date produced the highest APSY, while 5 May planting date produced the lowest APSY. The present results were in good agreement with finding of Johnson and Jellum[7], Killi and Gencer[8], who reported that early planted sunflower gave the highest seed yield. The cultivars were not significantly different for APSY. Inegöl (confection) and P-64A52 (hybrid-oilseed sunflower) had 80.33 and 82.64 g $head^{-1}$ APSY, respectively. It was observed a significant cultivar X planting date interaction for APSY (Table 1). The APSY of cultivars decreased as planting date delayed. 25 March planting date produced the highest APSY in two cultivars. APSY of Inegöl (confection) was decreased gradually when planting date was delayed from 25 March to 25 April, but from 25 April to 5 May planting date it was decreased rapidly (Fig. 1). APSY of P-64A52 (hybrid-oilseed) was decreased gradually when planting date was delayed from 25 March to 5 April. There were small differences between the APSY of cultivar in the second and third planting dates. But, from 15 April to 5 May planting date it was decreased rapidly. After the 5 May planting resulted in a significant increase in APSY of two cultivars.

Table 1: Data belong to average protected seed yield $head^{-1}$ (APSY), unprotected seed yield $head^{-1}$ (AUPSY) and yield loss or bird damage $head^{-1}$ (BD)

	APSY (g $head^{-1}$)	AUPSY (g $head^{-1}$)	BD (%)
Planting date			
25 March	102.29a†	27.90a†	72.62cd†
5 April	88.25b	31.60a	63.79e
15 April	86.27bc	31.47a	62.74e
25 April	79.69cd	12.32b	84.77a
5 May	58.41e	16.23b	72.99cd
15 May	71.80d	12.18b	82.96ab
25 May	77.31d	15.11b	77.46bc
5 June	87.87b	29.02a	68.11de
$LSD_{0.01}$	8.37	5.08	5.86
Cultivar:			
Inegöl (confection)	80.33a	29.07 a	63.63b
P-64A52 (oilseed)	82.64a	14.88b	82.68a
$LSD_{0.01}$	ns	7.10	11.93
Significance of cultivar X planting date F test	**	**	**

*, ** Significant at P< 0.05 and P< 0.01 levels of probability, respectively.
† Means not followed by the same letter differ at the 0.01 level of probability by LSD test
ns, not-significant

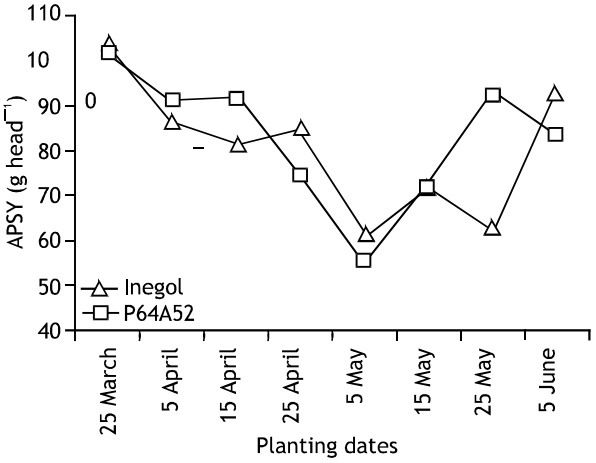

Fig. 1: APSY of two sunflower cultivars planted at 8 different dates

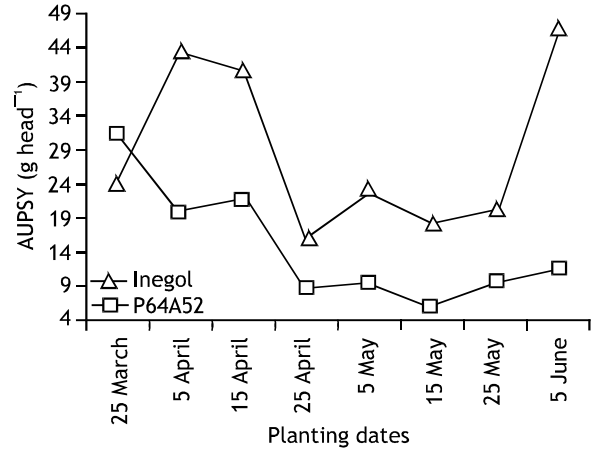

Fig. 2: AUPSY of two sunflower cultivars planted at 8 different dates

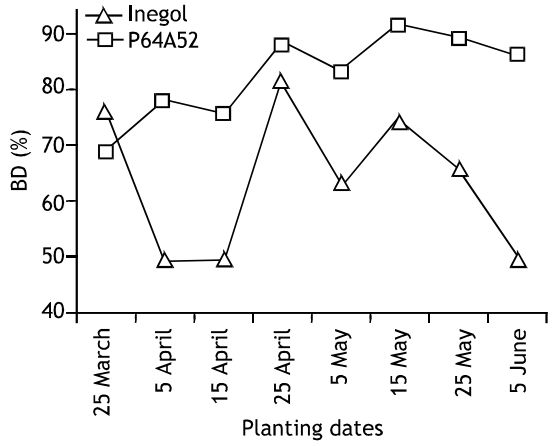

Fig. 3: BD of two sunflower cultivars planted at 8 different dates

Average unprotected seed yield (AUPSY): The AUPSY was significantly affected by the planting dates ($P<0.01$). AUPSY values for planting dates were 27.90, 31.60, 31.47, 12.32, 16.23, 12.18, 15.11 and 29.02 g head $^{-1}$, respectively (Table 1). 25 March, 5 April, 15 April and 5 June planting dates yielded significantly more seed yield than the other plantings. 25 April, 5 May, 15 May and 25 May planting dates produced the lowest AUPSY. The cultivars were significantly different for AUPSY. Inegöl (confection) and P-64A52 (hybrid-oilseed sunflower) had 29.07 and 14.88 g head^{-1} AUPSY, respectively. The cultivar X planting date interaction for AUPSY was significant ($P<0.01$). Inegöl (confection) sunflower cultivar had higher AUPSY than P-64A52 (hybrid-oilseed) at all planting dates except 25 March planting (Fig.2). AUPSY of P-64A52 cultivar was decreased rapidly when planting date was delayed from 25 March to 25 April, but after the 25 April planting date it was decreased gradually. At 5 April, 15 April and 5 June planted Inegöl (confection) sunflower cultivar yielded significantly more AUPSY than the other planting dates.

Yield loss or bird damage (BD): There were significant differences among the planting dates for BD (Table 1). 25 April planted sunflower had significantly more BD (84.77%) than the other plantings. This planting date was followed by the 15 May (82.96%), 25 May (77.46%) and 25 March (72.62%) plantings. It was found that 5 April (63.79%) and 15 April (62.74%) planting dates had the lowest bird damage. P-64A52 (oilseed) sunflower had higher BD than Inegöl (confection) sunflower (Table 1). BD for P-64A52 was approximately 20% higher than Inegöl. It was observed cultivar X planting date interaction ($P<0.01$) for BD. P-64A52 (oilseed) sunflower cultivar had higher BD than Inegöl (confection) at all planting dates except 25 March planting (Fig. 3). This result showed that oilseed sunflower cultivar was highly preferred by birds. Delaying planting until 5 June resulted in a significant increase in BD of P-64A52. In Inegöl (confection) cultivar, the BD at the first planting date was 5% higher than P-64A52 (oilseed). When planting was delayed from 25 March to 5 April, the BD was reduced 25% for Inegöl (confection) cultivar. There were no differences between the BD of Inegöl cultivar in the second and third planting dates. At the 25 April planting date, BD of Inegöl cultivar was increased. After the 25 April planting date until 5 June, it was decreased.

Results from this study indicated that planting date played an important role on the APSY, AUPSY and BD of sunflower. It was determined that there were significantly differences in BD among the planting dates. 5 and 15 April planting dates had the lowest BD in Inegöl (confection)

sunflower. On the other hand, delaying planting until 5 June resulted in a significant increase in BD of P-64A52. Oilseed sunflower cultivar was highly preferred than confection sunflower by birds.

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