

Comparative Efficacy of Different Covers Against Bird Damage and Their Effects on Berry Characteristics in Date Palm

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Abstract: Rose-ringed parakeet, house sparrow, bulbul and crows are major bird pests of date palm in arid western Rajasthan. Various covers were evaluated to protect the berries from bird damage. Nylon net (19-mm² mesh) afforded the maximum protection to berries but were the most costly. By their beneficial effects on fruit quality and high benefit to cost ratio, polyethylene bags, followed by gunny bags, proved to be better. Wire gauge coverings were difficult to handle in the effort to avoid mechanical injury to berries. Paper bags were not satisfactory on account of poor stability under wind or showers.

Key words: Date palm, bird damage, protective covering.

Birds cause severe damage to ripening fruits nearing harvest. Lakra *et al.* (1979) reported more than 30% fruit drop in jujube due to bird damage in Haryana. In Punjab, the damage caused was reported to be 19% in grape by bank myna, 20% in guava by parakeet, 7.33% in almond and a total of 32.21% in peaches (Toor, 1982). Mehrotra and Bhatnagar (1979) gave an account of the damage caused to different fruits by various species of birds. Singh and Vashishtha (1995) observed a mean fruit loss of 13.2% in different cultivars of jujube. Date palm is a well established fruit tree of coastal Gujarat, and has been introduced recently in arid western Rajasthan. Very little information is available on bird damage and its management in this crop. This article presents the results of a study on vertebrate pest problem in Rajasthan. Dates ripen during June-July, a period when food availability is scarce. Pre-monsoon rains always pose impending danger of fruit

deterioration by rot following the bird damage to berries. Covering the date bunches with iron wire gauge is a prevalent practice to protect them from bird damage. However, it is difficult to install or remove the wire gauge without berry damage. Hence, studies were undertaken to explore the suitability of other covering materials.

Materials and Methods

Studies on bird damage and protection of ripening berries of cv. Halawy against bird damage by using protective coverings were undertaken at the Date Palm Research Centre, Bikaner, during 1989 by selecting palms of near-equal age. The following 6 protective covers were used at the pre-doka stage of fruits: paper bags (1 m²), nylon net green (19 mm² mesh), nylon net black (8 mm² mesh), wire gauge (2 mm² mesh), gunny bags 50-kg capacity, and polyethylene bags 600-gauge (60 cm²). The protected fruit bunches were completely covered by the respective protective

Table 1. Bird pests of date palm and their incidence at Bikaner, (Rajasthan)

Incidence period	Bird species		Maximum activity (h)
	Common name	Scientific name	
May 24-June 08	Common Myna	<i>Acridotheres tristis</i> Linn.	08:00-10:00
	Bank Myna	<i>A. ginginianus</i> (Latham)	
May 24-July 28	Red vented bulbul	<i>Pycnonotus cafer humayuni</i> Deignan	08:00-10:00
	Bulbul	<i>P. goivier</i>	16:00-18:00
	White checked Bulbul	<i>P. leucogenys leucotis</i> (Gould)	
June 02-July 28	Sparrow	<i>Passer domesticus</i> (Linn.)	08:00-10:00
			16:00-18:00
June 08-July 28	Parakeet	<i>Psittacula krameri</i> Scopoli	08:00-10:00
			10:00-12:00
			16:00-18:00
June 08-July 28	House crow	<i>Corvus splendens</i> Vieillot	10:00-12:00
	Crow	<i>C. macrorhyncos</i> Wagler	16:00-18:00

covering material, avoiding protrusive exposure of berries out of the cover. These were evaluated against the control palms without any cover in four replications of one palm each.

Physical characteristics of fresh *doka* fruits were recorded for each treatment. Size was measured with vernier calipers. Per cent total soluble solids (TSS) of full *doka* fruits (*Khala* stage) were measured by refractometer.

Bird visits were observed daily throughout the day for their number and succession. Fruits dropped from the bunches were also collected and examined daily to isolate drops caused by bird damage and otherwise. The economic feasibility of using different netting material was also studied by taking into account the cost involved and the benefit accrued consequent to the protection afforded by the treatment.

Results and Discussion

The species of birds visiting date bunches and the successive periods of their activity

are given in Table 1. All stages of fruits (*doka* to *pinid*) suffered bird damage. Bulbuls (*Pycnonotus goivier*) were the predominant bird pests of date berries during the early part of the fruiting season (May-June) and parakeets (*Psittacula* spp.) at the ripening time (July). At any time between 06:00 to 10:00 h several birds could be seen on a bearing palm but the peak period of activity was early morning (08:00-10:00 h) and evening (16:00-18:00 h). The number of birds visiting the trees and the damage caused by them increased gradually through the fruiting season (May-July). A minimum of 6 birds per bunch usually caused damage between 06:00 to 10:00 h (Table 1). Parakeets posed continuous threat to the berries throughout the day, but were conspicuous by their absence in the hot afternoon hours. The rose-ringed parakeet, *Psittacula krameri*, is known for its diverse food habits and damaging activities throughout the year. Grewal and Kapoor (1986) regarded parakeets as the major bird

species causing damage to jujube in Punjab. Crow (*Corvus macrorhynchos*), although an early bird, visited the orchards fairly long after the day break. Most bird species were tolerant of each other and could be seen feeding simultaneously on the same plant, but the crows had a tendency to dominate by not allowing other bird species to simultaneously feed on the same bunch. The crow and the bulbul were distinct from the other species of the same group by their visits limited to the evening hours. Mynas were recorded for a very short period.

On the basis of observations on damage and activity, the most important depredating bird species on date berries were parakeet, followed by sparrows and crows. The damage by mynas was restricted to early June.

All the treatments afforded high protection from bird damage in contrast to the heavy damage in control. There was no bird damage to berries in any of the protection covering throughout the observation period, except a little damage (2.33 berries) on one day in the paper bag treatment. Bird damage

to berries could have increased if winds or rains would have damaged the paper bags. Maximum bird damage took place in control (Table 2). The damage due to mechanical injuries and other causes like fruit rot, piercing by leaf tips, etc., however, was substantially more in most of the treatments than under control, except in nylon net treatment. Mehrotra and Bhatnagar (1979) recommended nylon nets to protect bird damage to fruits. The damage to berries by physical injuries was the highest in gunny bags (381 berries), followed by nylon net black and polyethylene bags. Using larger size bags for minimum mechanical stress could reduce the higher berry damage in gunny bags and polyethylene bags.

Polyethylene bags afforded the best protection. The covering also had beneficial effects on fruit characteristics (Table 3). Fruit ripening was also advanced by a few days. However, fruit pulp was more in the control (open) bunches. Berries protected by gunny bags and polyethylene bags had the highest oven-dry weight and pulp content. Beneficial effects on fruit size and total soluble solids were appreciable for polyethylene bags, followed by wire

Table 2. Number of fruits damaged in different treatments

Treatment	24 June	01 July	08 July	15 July	Total
Paper bag	24.00	23.33	19.33	131.00	197.66
Nylon green	11.25	5.33	8.66	77.66	102.90
Nylon black	5.00	8.66	16.66	281.33	311.65
Wire gauge	27.00	29.66	30.33	139.66	226.65
Gunny bag	39.25	40.66	32.33	269.33	381.57
Polyethylene bag	26.00	32.33	18.00	298.00	374.33
Control	44.00	37.00	5.00	46.25	132.25
	(113.00)	(215.00)	(250.33)	(160.16)	(746.49)
SEm±					42.348
CD (P=0.05)					103.75

Table 3. Effect of mechanical barriers on mean characteristics of berries of date palm cv. Halawy

Treatment	Fruit size (cm)		Wt. of fruit (g)		Weight of stone (g)	Pulp (g)		T.S.S. (%)
	Length	Breadth	Fresh	Oven dry		Fresh	Dry	
Paper bag	3.45	1.86	6.24 ^a	2.42 ^a	1.39	4.85	1.03	25 ^{ab}
Nylon green	3.31	1.94	7.04 ^{abc}	2.58 ^a	1.26	5.78	1.32	26 ^{ab}
Nylon black	3.32	1.83	6.64 ^{ab}	2.14 ^a	1.39	5.25	0.75	22 ^a
Wire gauge	3.87	2.38	8.61 ^c	3.43 ^b	1.59	7.02	1.84	49 ^d
Gunny bag	3.64	1.98	7.85 ^{bc}	3.46 ^b	1.31	6.54	2.15	34 ^{bc}
Polyethylene bag	4.03	2.25	11.61	4.61	1.54	10.07	3.07	43 ^{cd}
Control	3.74	2.08	7.71 ^{bc}	2.74 ^{ab}	1.58	6.13	1.16	30 ^{ab}
SEm±	0.104	0.077	0.605	0.318	0.05			3.77
CD _{0.05}	0.254	0.180	1.48	0.779	0.12			9.23

Values with same alphabets in a column are statistically on a par.

gauge and gunny bag covers. It is inferred that physical support provided by the protective covers lead to better development of berries in various treatments than in control. The closed environment in polyethylene bags was conducive for the development of the largest size of berries due to little interruption of light, whereas in the case of paper bags, size of berries was the minimum, closely followed by gunny bag treatment. Polyethylene bags also turned out to be the cheapest (Table 4). Benefits derived were over and above the savings effected in labour requirement for bird scaring. The only possible drawback could be the accumulation of moisture and

rainwater in the event of precipitation, which may lead to fruit decay. This can be avoided by making a few perforations in the covering, particularly on the lower side of the bags. Because of high initial cost, nylon coverings were the costliest. On account of higher fruit yield of better quality *vis-a-vis* lower initial cost, polyethylene bag, followed by gunny bag covers proved to be economical and appropriate for preventing bird damage in date berries. However, the fruits need to be examined periodically to rule out possible damage by rots, etc. Nylon nets are durable (for >5 years) and prove economical in the long run. Paper bags afford a poor

Table 4. Cost: benefit analysis of various covers to protect dates from bird damage

Material	Treatment (cover)		Qty. used per bunch	Cost (Rs.)	Mean fruit yield		Profit (+) or loss (-) (Rs.)
	Unit	@ (Rs.)			Qty (kg)	Value (Rs.)	
Paper bag	Bag	5	2	10	5.220	52.20	-9.80
Nylon green 19 mm ²	sq. m	15	4	60	5.200	52.00	-8.00
Nylon black 8 mm ²	sq. m	25	4	100	5.490	54.90	-45.10
Wire gauge 2 mm mesh	kg	45	1	45	5.810	58.10	13.10
Gunny bag 50 kg cap.	1 bag	6	1	6	5.300	53.00	47.00
Polyethylene bag	1 bag	8	1	8	7.500	75.00	67.00

protection. Wire mesh covering, though used by many, is not considered appropriate since it carries the risk of mechanical damage to berries and also the risk of injury to workers.

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