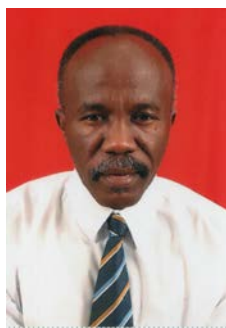


THE FRUGIVOROUS WHITE-EARED BULBUL BIRD, *PYCNONOTUS LEUCOTIS* DEPREDATING DATE FRUITS: BIOLOGY, FEEDING ECOLOGY AND MANAGEMENT

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Introduction

The date fruit is a single, oblong, one-seeded berry, consisting of pericarp (skin), fleshy mesocarp (pulp) and membranous endocarp around the kernel or pit. Date fruits pass through five stages of development; these are the *Hababouk* (just after fruit setting), *Kimri* (green small-sized), unripe *Khalal* or *Bisr* (50% moisture), ripened *Rutab* (30–35% moisture), and mature ripened *Tamr* (10–30% moisture) (Shomer *et al.*, 1998; Baliga *et al.*, 2011). Birds generally feed on dates during the sweet *Khalal*, *Rutab*, and *Tamr* maturation stages. The most important depredating bird species on date palm fruit are bulbuls, parakeets, house sparrows, crows, and mynas (Swaminathan & Verma, 2000; Zohoori *et al.*, 2007). Bulbuls are by far the most injurious avian pests on date palm in Africa and the Middle East (Khairi, 2015; Sedra, 2015). They are also potential dispersers of noxious weed seeds, besides being vectors and reservoirs for avian diseases and parasites (Islam & Williams, 2000). Bulbuls are mostly used as cage birds where they escape from captivity and establish themselves as feral populations. A good example of populating new areas is the introduction of the white-cheeked bulbul (*Pycnonotus leucogenys*) into Jordan from Syria and Iraq during 1980s and 1990s as cage birds (Khoury *et al.*, 2012). There are more than 137 species of bulbul birds worldwide (Beaman & Madge, 1998). The genus *Pycnonotus* comprising 36 species, which are mostly found in Asia and Africa (Keith, 1992). Of the 36 species of the genus *Pycnonotus*, 8 species were reported to feed on date fruits (Table 1). Out of these, 3 are considered serious pests of dates; the common bulbul,

Pycnonotus barbatus in Africa (Khairi, 2015; Sedra, 2015), white-cheeked bulbul, *P. leucogenys* and white-eared bulbul, *P. leucotis* in Asia (Swaminathan & Verma, 2000; Zohoori *et al.*, 2007). In this article, emphasis will be given to the white-eared bulbul due to the large extent of damage in many date producing countries. Information regarding its distribution, biology, feeding ecology, damage to dates, and possible management will be highlighted. Date damage by birds is overlooked and no adequate data describing this type of depredation are available. Thus, this article was written with the main objective of giving concise information on bulbul bird damage to date fruits and the possible measures for their management.

Identification/description

Bulbuls are small to medium-sized, long-tailed passerine birds with small crests in the family Pycnonotidae. They perch in angular postures and frequently sing while moving from one branch of a tree to another. It is difficult to differentiate between the males and females of bulbuls due to absence of a clear sexual dimorphism as is the case with many other birds. However, females as a rule are smaller than males and have rather more slender, down curved dark grey bills; they may also have fewer bright colors (Beaman & Madge, 1998). The size of an adult white-eared bulbul is about 18 cm long



Figure 1. A lateral view of an adult white-eared bulbul, *Pycnonotus leucotis* showing the main external features (Photo: Babiker M.A. Abdel-Banat).

BULBUL BIRD DEPREDATING DATE FRUITS

Table 1. Species of the genus *Pycnonotus* (Passeriformes: Pycnonotidae) reported to feed on dates worldwide.

Scientific name	Common name	Reference/s
<i>Pycnonotus leucotis</i> Gould	White-eared bulbul	Zohoori <i>et al.</i> , 2007
<i>Pycnonotus barbatus</i> (Desfontaine)	Common bulbul	Khairi, 2015; Sedra, 2015
<i>Pycnonotus nigricans</i> (Vieillot)	Red-eyed bulbul	Zaid & de Wet, 2002
<i>Pycnonotus leucogenys</i> (Gray)	White-cheeked bulbul	Swaminathan & Verma, 2000
<i>Pycnonotus cafer</i> Deignen	Red-vented bulbul	Islam & Williams, 2000
<i>Pycnonotus goiavier</i> (Scopoli)	Yellow-vented bulbul	Swaminathan & Verma, 2000
<i>Pycnonotus xanthopygos</i> (Ehrenberg)	White-spectacled bulbul	Radwan, 2017
<i>Pycnonotus jocosus</i> L.	Red-whiskered bulbul	Islam & Williams, 2000



Figure 2. An open cup-shaped nest of the white-eared bulbul, *Pycnonotus leucotis* containing two eggs. The nest is made of fine dry grass and neatly woven on the midrib of a date palm frond (Photo: Hamadttu A. F. El-Shafie).

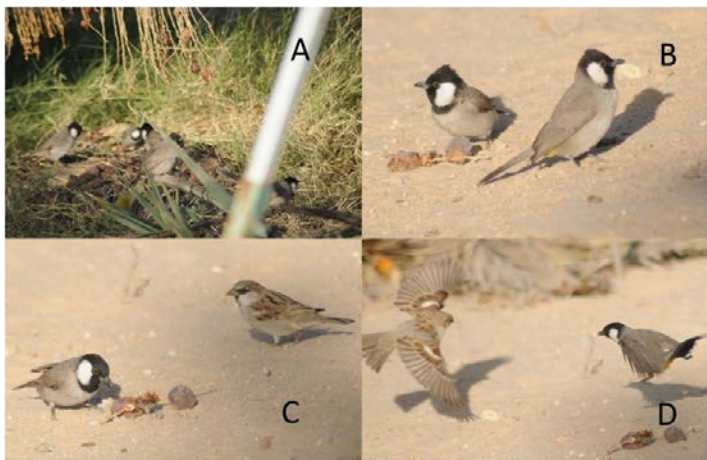


Figure 3. Feeding behavior of the white-eared bulbul, *Pycnonotus leucotis* on dates: Group of feeding birds (A), feeding pair (B), an adult bulbul showing intolerance to the presence of a female of house sparrow, *Passer domesticus* (C), Bulbul defending its feeding territories against the intruder house sparrow (D) (Photo: Babiker M.A. Abdel-Banat).

(from tail to beak), weighing 30–45 g. Head and throat are black with conspicuous white large patches covering the ears, and hence the common name of the white-eared bulbul (Fig. 1). The vent (under tail coverts) is orange-yellow and the tail is dark with white tips while the rest of body plumage

is greyish-brown and the wings are darker. The legs and feet are dark grey and the front from the chest to the belly is light grey. The dark eyes are surrounded by pale bare eye-rings. The juvenile bulbuls can be differentiated from the adults by their paler heads, grey ear coverts, and pale yellow vents (Srivastava, 2010). There is great similarity between the white-eared bulbul and the white-cheeked bulbul and they are often confused. However, the former is smaller with a larger white patch and has no apparent crest. Additionally, the white-eared bulbul has a pale bare eye-rings which are absent in the white-cheeked bulbul (Beaman & Madge, 1998).

Geographical distribution

The white-eared bulbul is native to Afghanistan, India, Iraq, Iran, Kuwait, Pakistan, and Saudi Arabia. It has also been introduced into Bahrain, Oman, Qatar, United Arab Emirates, Israel, Jordan, and Syria (Birdlife International, 2016).

Habitat requirements

Bulbuls are associated with human habitation and are found in agricultural as well as urban environments such as parks, home gardens and orchards. They inhabit forest, scattered trees, scrubs and human settling. Bulbuls avoid colonizing open areas without trees because they have short and rounded wings, which are not suitable for long distance flight (Khoury *et al.*, 2012). Thus, they are found in farms, orchards, and palm groves where fruit-bearing trees and drinking water are available (Keith, 1992).

Biology

Bulbuls make untidy, cup-shaped nests made from fine twigs, dry grass and plant fibers concealed in branches of many trees. The number of eggs per clutch is usually 2–3 which are usually creamy-white with purple dots (Fig. 2). Bulbuls are monogamous and territorial with males aggressively defending their territory against other males (Srivastava, 2010). The female typically builds the nest, lays her eggs (clutch size) and incubates them. Incubation period is 14–15 days and both parents attend the chicks, which reach the fledgling stage in about 15 days and may leave the nest a week later. The food of young chicks consist largely of small insects, the propor-



Figure 4. The white-eared bulbul, *Pycnonotus leucotis* feeding damage on different types of fruit: Date (*Phoenix dactylifera*) fruit (A), Christ-thorn (*Ziziphus* spp.) fruit (B), mesquite (*Prosopis juliflora*) fruit (C), adult bulbul repeatedly striking its beak against the midrib of date palm frond after feeding (D) (Photo: Hamadttu A. F. El-Shafie).

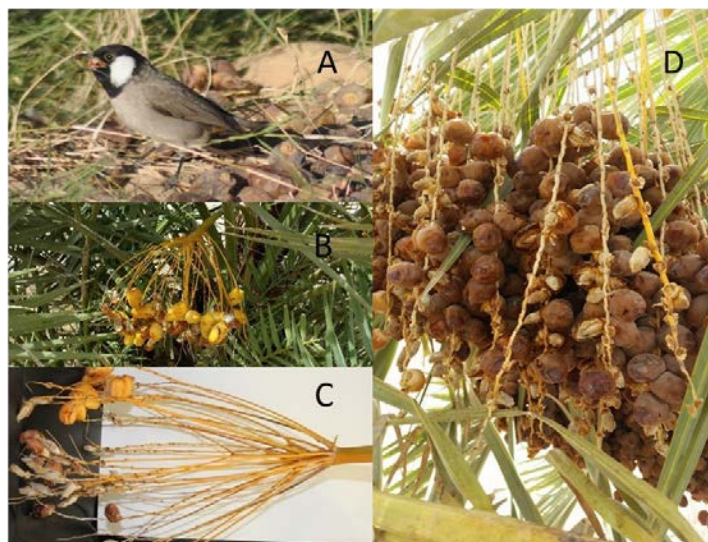


Figure 5. Depredation of white-eared bulbul, *Pycnonotus leucotis* on date fruits: Adult bulbul feeding on fallen dates (A), damage on Rutab-stage (B), severely damaged bunch showing the pits attached to the strands after the pulps of fruits have been removed by the bulbuls (C), a bunch of dates at Tamr-stage depredated by the bulbuls (D) (Photo: Hamadttu A. F. El-Shafie).

tion of which declines with aging of hatchlings. Bulbuls can raise 2–3 broods annually. The white-eared bulbul breeds in March–June (Srivastava, 2010).

Feeding behavior and ecology

The white-eared bulbul feeds mainly upon fruits (frugivorous), seeds, and small insects. It can also feed on nectar, flower buds, and flowers. Bulbuls usually hold the date fruit firmly with their beaks, knocking it against the soil (for fruits fallen on the ground) or nearby stones, shaking it vigorously to tear small piece before swallowing it. For dates on the bunch, the birds peck small pieces while the fruit is still attached to

the strand. In the case of fruits that are strongly attached to their strands, bulbuls remove all the flesh (mesocarp), leaving the pit (seed) attached to the strand. These birds mostly feed gregariously (in flocks); however, they can also be found in pairs or individually (Fig. 3). Many individual bulbuls have been observed to take date fruits to their roosting site (about 100 meters away from the fruiting palms). During feeding on dates, bulbuls were observed to frequently quarrel and chase each other. Additionally, they were also intolerant of the presence of other bird species, particularly *Passer domesticus* (house sparrow), in their feeding territories (Fig. 3). In addition to dates, white-eared bulbul were observed to feed on mesquite, *Prosopis juliflora* fruit pods while they are still green as well as Christ-thorn, *Ziziphus* spp. fruit. After feeding on dates, bulbuls strike their beaks against the midrib of the date fronds (Fig. 4). This behavior is presumably to remove any sticky pieces of ripe dates that might have stuck on their beaks. The white-eared bulbuls usually feed in the early hours of the morning (8:00–10:30) and rest the midday with only a few birds confining their activities to grooming their feathers and jumping from one tree branch to another without feeding. The second peak of feeding activity is about 2 hours before sunset, where many birds have been observed to feed voraciously on dates. About 10 bulbuls were observed on a single date bunch in the afternoon and around 300 bulbuls were estimated to be in an area of one acre (0.42 hectare). Bulbuls usually produce characteristic songs while feeding on dates, very much different from the alarm voice they produce when disturbed.

Depredations on dates

The nature of injury inflicted by bulbuls on dates is characteristic, regardless of whether the dates have seeds or they are seedless (Fig. 5). Such kind of damage lowers date fruit quality and renders them unacceptable for human consumption. The same pattern of damage was also observed on different date varieties of different sizes and colors. Damage on dates by bulbuls may facilitate the entry of insects and fungi that



Figure 6. Wrapping the date bunch (Young palm A, Old palm B) with mesh green plastic bags does not protect dates from white-eared bulbul depredation. The date fruits in contact with the bag are liable to feeding damage by the birds (Photo: Hamadttu A. F. El-Shafie)

spoil the dates further. Bulbuls have been reported to disperse the seeds of noxious weeds in some parts of the world, thus, are indirectly harmful to agriculture (Islam & Williams, 2000). Damage to the tip of date fruit caused by the feeding bulbuls during the Rutab stage leads to evaporation of moisture and premature drying out of the fruit, which eventually fails to ripen to tamar stage. Bulbuls might cause more damage on dates by repeatedly plucking and dropping the ripe dates as they unsuccessfully attempt to feed on them (Fig. 5A). This usually happens during tamar stage when fruits are loosely attached to the bunch strands through their caps. Bulbuls can also spoil dates while on the bunches with their droppings. Flocking bird species usually inflict enormous damage by removing large numbers of date fruits compared with solitary bird species during one foraging visit. The white-eared bulbul could cause an average damage of 20% or more to dates of the popular variety “Khalas” where all observations during this study were made. This date variety yield about 66.57 kg/palm (AlSaikhan & Sallam, 2015) and the price per kg is \$ 2.6 (Qat, 2014). Based on this information, the annual cost due white-eared bulbul injury could be \$35 per palm at 20% level of damage. Additionally, the management of bulbuls using bunch covers adds substantially to production cost.

Management

The development of an effective bird-damage management program is difficult due to many factors including the birds' mobility and their unpredictably changing feeding sites. Knowledge of damage patterns of bulbuls on dates is essential to develop suitable management strategies against them. For example, the bimodal feeding activity pattern, which peaks in the morning and in the late afternoon, can be exploited to intensify and synchronize management tactics. Many techniques have been used to manage bird depredations on field crops such as visual repellents, chemical repellents, optical repellents, however, few of these methods are effective in relieving damage on these crops (Kale *et al.*, 2011). The pre-recorded distress call of parakeets was used as bio-acoustic technique to manage parakeets in Indian agricultural sectors (Suubramanya, 1982). As a preventive measure, harvested dates should not be left uncovered for long periods in the field, thereby avoiding an invitation to depredating bulbuls. Spreading of dates on mats for sun drying, which is practiced in some date-growing countries, should be carried out with complete exclusion of birds by using special nets or covers. Removal of bulbul perching places, roosting sites, and water resources can help mitigate the depredations of these birds on dates. Pre-harvest fruit bagging is considered one of the most important good agricultural practices (GAP) used to produce high quality and healthy fruits (Sharma *et al.*, 2014). Fruit bagging has been used to help reduce damage to dates caused by birds and other injury-causing agents (Harhash & Al-Obeed, 2010). Many types of bags including woven cotton, weave mesh, nylon weave, polyethylene, and wax paper were used (Swaminathan & Verma, 2000). The suitability of these types of bags for protection of dates against birds depend very much on the date palm variety and prevailing climatic conditions. Moreover, this technique has

been reported to enhance ripening and fruit quality of some date cultivars (Awad, 2007). However, the right size of mesh and suitable materials should be chosen, because birds can insert their beaks through wide-mesh bags and peck on the date fruit inside (Fig. 6B). Polyethylene and gunny bags were found to be economical and suitable for protection of dates from bird damage (Swaminathan & Verma, 2000). Zohoori *et al.*, (2007) reported that fishing nets were successfully used for protection of date bunches from depredation by the white-eared bulbul, however, they did not mention the magnitude of relief afforded by these nets. Bunch covers should not affect the ventilation of fruits, which is essential during these stages of fruit development. Early harvesting of dates may be considered one of the most important agrotechnical measures to lessen the magnitude of bird damage on dates.

Conclusion

The white-eared bulbul, *Pycnonotus leucotis*, is one of the most serious avian pest of date palm. It causes severe depredation on dates that tremendously lowers date quality and results in substantial economic losses. However, the damage to dates inflicted by the bulbuls and their management is overlooked when farmers calculate their production costs. Covering fruit bunches with suitable bags, at the right time of maturation, is the most suitable and practical measure to alleviate bulbul damage on date fruits. In this respect, more research is needed to find cost-effective bunch covers that provide maximum bird protection and least adverse effect on developing date fruits.

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