# Prevention of Rose-ringed Parakeet *Psittacula krameri* damage to sunflower *Helianthus annus*—a new approach

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## Abstract

Sunflower *Helianthus annus* is an important oilseed crop in semi-arid and rain fed areas of the Mysore district of Karnataka state (India). The crop is grown in isolated patches. It attracts a large number of Rose-ringed Parakeets *Psittacula krameri*. Even by following the recommended prevention practices, the crop is not fully protected from parakeet damage and the farmers lose 10–40% of the crop. Field experiments were conducted near Mysore, to protect sunflower from parakeet damage. Newer ways were developed to prevent the sunflower heads being eaten by parakeets. Coloured decorative tencil, coloured carry-bags and shiny paper plates were placed on the backs of sunflower heads to scare off the parakeets. These materials were placed on the plants randomly in different blocks. Parakeets did not damage the treated plants for the entire duration of the study. The treated blocks had significantly lower parakeet damage compared to the control blocks. Thus, the mechanical placement of tencil, carry-bags and plates can form an important tool in the management of parakeet damage in sunflower. The behavioural basis of protection against parakeet damage and cost involved are also discussed.

## Introduction

Sunflower *Helianthus annus* is one of the important oilseed crops in southern Karnataka, India. Many farmers grow it in small areas in isolated patches. Such isolated patches attract Rose-ringed Parakeet *Psittacula krameri*, which causes heavy losses (Rao 1999; Basappa & Prasad 2005; Rao & Dubey 2006). The Rose-ringed Parakeet is known to cause 10–30 per cent damage in Andhra Pradesh and 40–90 per cent damage in Rajasthan. In Punjab, the mean percentage of parakeet damage in different years ranged from 5.7–29 per cent (Rao & Dubey 2006). The Rose-ringed Parakeets cause more than 90 per cent damage when sunflower is grown in isolated areas (Basappa & Prasad 2005). There are many management techniques available for reducing the yield loss in sunflower (Rao & Dubey 2006). These techniques include, using reflective ribbons, bioacoustics, pyro-techniques, screen crops, botanicals, habitat management, *etc*., however these techniques are not popular or not being properly utilized by the farmers. Many of these techniques are time consuming, effective for only short periods or involve high costs. Some of the techniques are not effective in the long run as parakeets get habituated to them gradually (Rao & Dubey 2006). Therefore, there is a need to develop alternative methods that are effective, economical and eco-friendly. The present study was conducted in Mysore district of Karnataka to demonstrate effective methods of deterring parakeets from damaging sunflower crop.

## Material & methods

The experiment was conducted at Chuncharayanahundi village, of Mysore taluk, Karnataka, India. The study site was situated in a valley surrounded by small hills and forest. Here, majority of the farmers did not prefer to grow sunflower fearing heavy damage by parakeets. As a demonstration from the Extension Education Unit of the Agricultural Research Station, Naganahalli near Mysore, the sunflower crop was grown at Chuncharayanahundi.

Total cropped area under sunflower was 0.4 ha. The cropped area had trees all around except towards the north. The crop was monitored at regular intervals for the appearance of parakeet damage. A sunflower head showing symptoms of feeding by parakeets was recorded as damaged. The cropped area was divided into seven blocks. Four treatments were imposed into these blocks at random. Soon after the initial feeding by parakeets, the treatments detailed below were imposed on 20th September 2007. The number of such sunflower heads damaged by parakeets prior to imposing treatment, and after the 13th (3rd October 2007) and 27th days (17th October 2007) after treatment was recorded for each block in treated and untreated plants. The quantum of feeding in each head was not taken as a criterion. The crop was harvested on 18th October 2007 and the yield from 100 plants from each treatment, except in treatment 4s (n=43), was collected.

**Treatment 1:** Coloured decorative tencils (Fig. 2a), each 30 cm long, were tied onto the backs of sunflower heads with a knot. Coloured tencils namely, blue, red, pink, yellow and silver were used in each block. The tencil was tied to the tallest plants among the group of 4–5 adjacent plants (Fig. 2b). This treatment was imposed to Blocks II, IV and VII. In these blocks eight partially damaged heads were treated with tencil and the plants were marked. These plants were observed for any further damage by parakeets. The cost of tencil was Rs. 20/- per 15 m.

**Treatment 2:** White (n=200) and black (n=183) coloured, commercially available, plastic carry-bags (25x50 cm) were used (Fig. 3). The handle side of the bags was tied to the back of a sunflower head. The bags were tied to the tallest plants among the group of 4–5 adjacent plants. This treatment was imposed in Block III. The cost was Rs 30/- per 100 bags.

**Treatment 3:** Silver-coloured paper plates were used in this treatment. The plates were cut along the radius at one point. These plates were placed behind the sunflower head so that the silver-coloured side of the plate faced upwards (Fig. 4). This treatment was imposed in Block V. The cost was Re 1/- per plate. After placement, the cut end of the plate was joined together using a stapler. Different-sized (20–40 cm diameter) plates were used for different sized sunflower heads.

**Treatment 4:** Blocks I and VI were used as 'control blocks', without imposing any of the above treatments.

## *Results & discussion*

### *General feeding behaviour by Rose-ringed Parakeet*

Rose-ringed Parakeets first settled on trees bordering the crop field. In each tree 6–13 parakeets were recorded (Fig. 5). After spending about 10–20 min on the trees, they flew down to the sunflower crop—either to the border plants or to the tallest plants closer to border to feed. The parakeets foraged during 0730–0930 hrs and 1530–1730 hrs. On the day of imposing treatments, the parakeets settled on the same trees but none of them flew down on to the sunflower plants. On the three subsequent days, parakeets settled on adjacent trees but none entered the treated blocks. From the fourth day onwards, a few parakeets were found foraging on the tall plants in the control blocks. Large numbers of parakeets were found feeding in untreated plots from the ninth day. At the beginning of the study, three flocks, consisting of 4–7 individuals were seen. After 15 days, nine flocks of parakeets were found feeding in the study plot.

### *Feeding behavior of Rose-ringed Parakeets on individually treated plants*

**Treatment 1:** Here, parakeets did not damage any of the treated heads till the end of the study. There was no difference in parakeet damage amongst the heads treated with different coloured (six) tencils. All the colours of the tencil faded to silver 10–15 days after treatment imposition (Fig. 6). Even these faded tencils served well to prevent parakeet feeding and consequently no parakeet damage was observed on the tencil treated plants.

There was no further feeding by the parakeets in previously damaged sunflower heads after they were treated with tencil (Fig. 7). The area of the sunflower heads, which had been fed upon earlier, had turned black, indicating no further feeding on such heads. On the other hand, fresh damage by parakeets on the sunflower head resulted in exposure of white tissue (Fig. 8). The total yield from this treatment was 4.30 kg from 100 treated plants (Fig. 1).

The possible reasons by which coloured tencils prevent parakeet damage are: the very presence of the coloured tencil on the back of the head was not a familiar sight for the parakeets and hence was avoided. Further, the swaying / waving action of the tencil in the breeze appears to scare away the parakeets. Also, under sunlight, the coloured tencil reflects light from different angles and the slightest movement of the tencil in the breeze magnifies this effect and hence the parakeets appear to get scared. In addition, wind-blown tencils create a rustling sound, which also possibly scares the parakeets away. All these factors act upon feeding parakeets individually or as a flock, preventing them from damaging the crop.

**Treatment 2:** Parakeets did not damage any of the plants tied with the carry-bags (both white & black) (Fig. 9). The total yield from this treatment was 4.10 kg from 100 treated plants (Fig. 1).

The possible reasons for the success of this treatment are: as observed in Treatment 1, the presence of bags was not a familiar sight for the parakeets. The bags swayed in the slightest breeze and this movement appeared to scare the parakeets. As with the tencils, the bags also rustled in the wind and this appeared to scare the parakeets. All these factors appear to act individually or together in preventing parakeet damage.

**Treatment 3:** There was no parakeet damage observed in the plants treated with plates. The total seed weight from 43 plants in this treatment was 1.87 kg (Fig. 1).

The unfamiliar sight of the plates appears to deter the parakeets from feeding on the treated heads. The reflective action of their shiny silver surface appears to add to this effect as well. Also, the plates may not offer ideal perching surfaces on the sunflower heads for the parakeets, as they

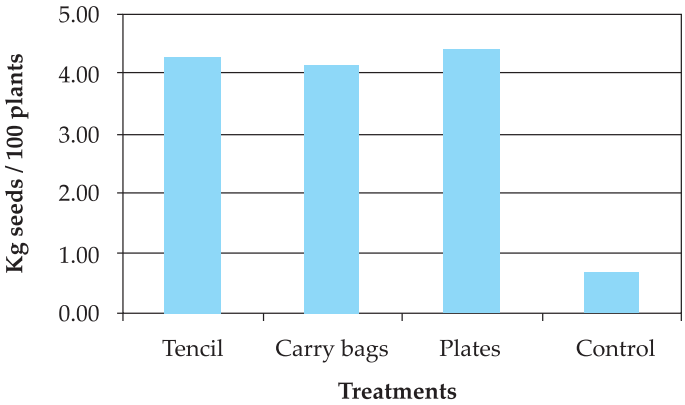


Fig. 1. Grain yield obtained in different treatments.

are smooth and slippery. Again, all these factors appear to act individually or collectively in preventing parakeet damage.

**Treatment 4:** Parakeets damaged most of the plants (94.42%) under this treatment (Table 1). The damage to individual plants was highest in these plants compared to any of the treated plants (Fig. 10). The total yield was 0.68 kg from 100 treated plants (Fig. 1).

*Effect of different treatments on yield of sunflower*

The weights of seeds from treated plants, 4.15–4.40 kgs/ 100 plants, were on par across different treatments. There was reduction in the yield in control plants—0.68 kg/100 plants) (Fig. 1).

*Effect of different treatments on the parakeet damage block-wise*

At the beginning of the study there was no appreciable difference in the parakeet damage amongst treated (1.26%) and control blocks (1.41%) (Table 1). By the 13th day the damage by Rose-ringed Parakeets increased drastically in control blocks (93.37%) and to some extent in Block V (21.44%). Parakeet damage was low in Treatment 1 (0.98%) in Blocks II, IV and VII and in Treatment 2 (0.51%) in Block III.

**Table 2. The percent sunflower heads damaged by birds in different treatments**

| Treatments | Total heads | Bird damaged | % damage |
|---|---|---|---|
| Tencil | 3157 | 179 | 5.67 |
| Bags | 1182 | 8 | 0.68 |
| Plates | 597 | 454 | 76.05 |
| Control | 1705 | 1592 | 93.37 |

At the end of the study the bird damage was highest in control blocks (93.37%) and in Treatment 3 of Block V (76.05%) (Table 2). The damage in the Block V was comparable to the control blocks. This could be due to lower number of plants (n=43) that were treated. Another reason could be that the plates only provided reflective effect without any movement as in reflective ribbons (Rao & Dubey 2006) or as in the tencil or carry-bag treatments. It is known that presence and movement of unfamiliar objects while landing or feeding, scares the birds away. The absence of such effect probably increased bird feeding in Block V. The bird damage was lowest in Treatment 2 (0.68%) of Block III and Treatment 1 imposed (5.67 %) blocks (Table 2).

The sudden increase in parakeet damage in Blocks I, V & VI was due to increased number of birds feeding. Basappa & Prasad (2005) have reported such a sudden increase in damage. They have reported that Rose-ringed Parakeets invade the sunflower in flocks and inflict heavy damage in a shorter time from milky stage onwards, continuing till harvest.

Thus, it can be concluded from this study that the placement of coloured tencils and carry-bags are effective in reducing Rose-ringed Parakeet damage in sunflower. Future studies on development of habituation by parakeets to these coloured tencils and carry-bags, if any, over long periods and over several seasons need to be taken-up. Although, averaging the data on the extent of damaged head in tensil and bag treated plants (Table 1) indicates that by treating 21.67 and 47.93 per cent of the plants with tencils and bags, the parakeet damage was reduced to 2.34

Table. 1. The Rose-ringed parakeet damage to sunflower heads in different treatments / blocks and times during the study

| Blocks | Treatment | Total Plants | Damage on 1st day 20.ix.2007 | 13th day 3.x.2007 | 27th day 17.x.2007 | Damage (%)* |
|---|---|---|---|---|---|---|
| I | Control | 1012 | 8 | 690 | 899 | 88.83 |
| II | Untreated | 1178 | 4 | 4 | 61 | 5.18 |
| | Tencil | 271 | 0 | 0 | 0 | 0.00 |
| III | Untreated | 799 | 6 | 6 | 8 | 1.00 |
| | Bags | 383 | 0 | 0 | 0 | 0.00 |
| IV | Untreated | 830 | 10 | 11 | 61 | 7.35 |
| | Tencil | 185 | 0 | 0 | 0 | 0.00 |
| V | Untreated | 554 | 18 | 128 | 454 | 81.95 |
| | Plate | 43 | 0 | 0 | 0 | 0.00 |
| VI | Control | 693 | 16 | 413 | 693 | 100.0 |
| VII | Untreated | 579 | 16 | 16 | 49 | 8.46 |
| | Tencil | 114 | 8 | 8 | 8 | 7.02 |

*The values were found to be significantly different at $P < 0.05$; d.f. = 11; $x^2$=693.35.

**Table 3. Cost details of imposing different treatments for prevention of parakeet damage in sunflower**

| Material used | Cost (Rs.) | Cost per hectare |
|---|---|---|
| Coloured decorative tencil | 20 per 15m | 2200.00 |
| B&W plastic carry-bags | 30 per 100 bags | 1500.00 |
| Silver colored paper plates | 1 per plate | 5000.00 |
| Cost for imposing treatments: 2 man days | 100/day/labour | 200.00 |
| Manual scaring | 100/day/labour | 4000.00 |

and 0.00 per cent, respectively, more detailed studies are required to ascertain the exact number of plants that needs to be treated per hectare, to achieve total prevention of parakeet damage in sunflower. Such studies need to be carried out separately in different parts of the country.

## *The cost factor*

The cost of coloured tencil, carry-bags and plates per hectare would be Rs 2,200/-, 1,500/-and 5,000/-, respectively, if 5% of the plants were treated (Table 3). Two man-days are required for imposing each treatment in one hectare. The number of plants to be treated depends on the intensity of parakeet menace and the area of crop grown. Further studies are needed to confirm these aspects. Earlier studies on the use of reflective ribbon have shown to cost Rs 675/- per ha, which is less than the cost of employing two labourers @ Rs 2,000/- per ha from grain filling stage till the heads are harvested (Rao & Dubey 2006). Similarly, the use of tencils and carry-bags would still be cheaper than employing two labourers @ Rs 100/- per day per person for 20 days to manually scare away the parakeets.

In an earlier study, Subramanya (1994) observed that foraging parakeets were very selective in feeding on plants that afforded a good view of their surroundings and the damage to sunflower heads was dictated by factors that aided better predator vigilance. However, the present study clearly indicates that unfamiliar objects attached around the sunflower heads and their movement in a breeze would greatly deter feeding parakeets from landing on sunflower heads. It is quite possible that these 'extra-fittings' on sunflower heads might make the heads look strange and bring in a sense of caution among parakeets and prevent them from depredating treated heads. The deterrent effect of transformed (treated) sunflower heads appears to have a greater effect, than predator avoidance. Thus, transforming crop features that would affect birds' familiarity with the crop, could be a new way of protecting crops from parakeet damage. Compared to the various options available for management of bird pests (Rao & Dubey 2006), the use of tencils and carry-bags appears to be non-destructive and the most effective method in providing total control of parakeet damage in sunflower.

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Fig. 2a

Fig. 2b

Coloured tencils and their placement on the back of the sunflower heads

Fig. 3a.

Fig. 3b.

White & black coloured bags tied to the back of the sunflower heads

Fig. 4. Placement of silver coloured reflective plate on the back of the sunflower head

Fig. 5. Parakeets perching on trees before invading the sunflower plot & freshly fed sunflower head.

Fig. 6. The faded coloured tencils at the end of the study.

Fig. 7a.

Fig. 7b.

Lack of feeding by the parakeets when treated with tencil.

Fig. 8. Sunflower head freshly damaged by parakeets showing white areas of head after removal of grains.

Fig. 9. Sunflower crop protected by black and white carry-bags against parakeet damage till the end of the study.

Fig. 10. The sunflower head in the control plant (left) and in the treated plants (right).