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# Assessment of rose-ringed parakeet (*Psittacula krameri*) Depredations to Guava Fruits

**Jyoti G Dulera and Ashish H Nayi**

**Abstract**
Yield loss due to parakeet depredation recorded was 11.66 per cent in guava orchard of middle Gujarat Agro Climatic Zone. Fruit damage and number of parakeet bird was higher in morning hours than evening hours. Guava orchard is needed to protect against parakeet depredation to cultivate it economically.

**Keywords:** Rose-ringed parakeet, Guava, "V" shape mark

## Introduction
Guava (*Psidium guajava*) can be considered as one of the most ideal crops for dry Deccan Plateau region of India. Its cultivation has become highly remunerative agriculture business in India. The parakeet has acquired the status as a serious vertebrate pest for the agricultural and horticultural crops (Shafi *et al*. 1986; Khan & Beg, 1998) [7, 2]. Seven species of birds were recorded in Guava orchards in India, of which rose-ringed parakeets *(Psittacula krameri)* and house crow (*Corvus splendens*) were predominant and inflicting damage to the fruits in Punjab (Malhi and Kaur, 1998) [5]. Guava (*P. guajava*) was found the most preferred fruit of Rose-ringed parakeet *(P. krameri)*. The parakeets showed preference both for unripened/rind and ripened fruits. The parakeet is the most common and the destructive bird of India which inflicts huge damage to grain of standing crops, orchard fruits and vegetable crops. (Kushwaha and Prabhat, 2004) [4]. Khan *et al*. (2006) [3] reported 20.1% - 40% damage by parakeet on Guava fruits. Fruits and vegetables form an important part of the economy of India. The rose-ringed parakeet serves as the worst vertebrate pest of India not only damages the food sources, but also causes considerable economic losses to farmers and national economy. Due to its wide feeding niche, it is regarded as one of the most destructive vertebrate pests. Thus, the present experiment was planning to assess parakeet depredation on Guava fruits.

## Materials and Methods
The present study was carried out in middle Gujarat, Horticulture Farm, Anand Agriculture University, Anand. Net plot size was 44 m X 16.5 m. Total 20 trees of Local Red variety of Guava was selected from horticulture farm (Plate-1) and tagged for observation. Observation of parakeet damage by observing 'V' shape marking on fresh fruit was recorded from seven months *Viz*., March and April and June to August, and again in November and December. Depredations on fruits were estimated through direct field observations. Observations were recorded during morning (7:30 am to 9:30 am) and evening (5:00 pm to 7:00 pm). Parakeet depredations inflicted fruits were numbered, weighed. The data obtained thus, subjected to statistical analysis after appropriate transformation to draw valid conclusion.


Experimental orchard, Horticulture Farm, AAU, Anand


Damaged fruit by rose–ringed parakeet


Rose ringed parakeet obserdved in Guava orchard

**Plate 1:** Experimental view of Guava orchard and damaged fruit by Rose ringed parakeet

**Result and Discussion**

During the period, total 860 observations were recorded for visitation of parakeet on guava tree. Average 42.81 mean number of birds was recorded in guava orchard during morning while it was recorded average 35.42 mean numbers of birds during evening. Difference in bird visitation during evening and morning period was found statistically significant (Table-1). The fruit damage was recorded 0.97 % and 0.54 % in morning and evening period, respectively. Statistically significant differences were found due to parakeet depredation by t-test (Table-2). Estimation of the predication equation indicated a sufficiently strong coefficient of regression $R^2$ (0.35%) for damage assessment on guava was Y(MD+ED)= 0.162 + 0.015X (MP+EP) (Table-3). The regression equation predicted for the parakeet visit in morning on guava was Y(MD)= 0.277 + 0.016 X (MP) (Y= Morning Damage; X= Morning Parakeet), while the coefficient of estimation $R^2$ (0.59%), indicated a positive relationship between the parakeet visit and depredation in the morning (Table-4). The regression equation predicted for the parakeet visit in evening on guava was Y(ED) = 0.139 + 0.011 X (EP) (Y= Evening Damage; X= Evening Parakeet), while the

coefficient of estimation $R^2$ (0.30%), indicated a positive relationship between the parakeet visit and depredation in the evening (Table-5). Other bird community also recorded during march- December 2018 and march- December 2020 (Table-6).

**Table 1:** Morning and Evening visitations of rose –ringed parakeet in experimental plot (Year 2018 & 2020)*

| Variable (Pair 1) | N | | | Mean | | | Std. deviation | | | Std. Error Mean | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled |
| Morning Parakeet | 480 | 380 | 860 | 41.47 | 44.49 | 42.81 | 27.232 | 21.016 | 24.712 | 1.243 | 1.078 | 0.843 |
| Evening Parakeet | 480 | 380 | 860 | 34.28 | 36.85 | 35.42 | 23.437 | 18.412 | 21.389 | 1.070 | 0.945 | 0.729 |

| Paired Sample T- Test | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pair 1 | T | | | Df | | | Sig. (2- tailed) | | |
| | 2018 | 2020 | pooled | 2018 | 2020 | Pooled | 2018 | 2020 | pooled |
| Pair t Test | 25.958** | 24.147** | 35.446 ** | 479 | 379 | 859 | 0.00 | 0.00 | 0.00 |

** significant at 1%

**Table 2:** Intensity of Morning and Evening rose –ringed parakeet depredations in experimental plot. (Year 2018 & 2020)*

| Variable (Pair 1) | N | | | Mean | | | Std. deviation | | | Std. Error Mean | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2020 | pooled | 2018 | 2020 | Pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled |
| Morning Damage | 480 | 380 | 860 | 0.88 | 1.08 | 0.97 | 0.889 | 0.726 | 0.827 | 0.041 | 0.037 | 0.028 |
| Evening Damage | 480 | 380 | 860 | 0.47 | 0.63 | 0.54 | 0.602 | 0.574 | 0.594 | 0.027 | 0.029 | 0.020 |

| Paired Sample T- Test | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pair 1 | T | | | Df | | | Sig. (2- tailed) | | |
| | 2018 | 2020 | Pooled | 2018 | 2020 | Pooled | 2018 | 2020 | pooled |
| Pair t Test | 9.696** | 10.672** | 14.248 ** | 479 | 379 | 859 | 0.00 | 0.00 | 0.00 |

**significant at 1%

*In year 2019, trees were pruned to manage bark eating caterpillar infestation and as a result the experiment was not possible to conduct

**Table 3:** Effect of parakeet on damage assessment in experimental plot (Year 2018 & 2020)

| Model | Sum of squares | | | Df | | | Mean square | | | F | | | Sig. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2020 | Pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled |
| Regression | 142.333 | 67.480 | 215.479 | 1 | 1 | 1 | 142.333 | 67.480 | 215.479 | 303.947 | 173.209 | 492.277 | 0.000[a] | 0.000[a] | 0.000[a] |
| Residual | 448.616 | 295.308 | 752.000 | 958 | 758 | 1718 | 0.468 | 0.390 | 0.438 | | | | | | |
| Total | 590.949 | 362.788 | 967.479 | 959 | 759 | 1719 | | | | | | | | | |

| Model | Unstandardized Coefficients | | | | | | standardized Coefficients | | | T | | | Sig. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | | | Std. Error | | | Beta | | | | | | | | |
| | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled |
| 1 (Constant) | 0.105 | 0.251 | 0.162 | 0.039 | 0.051 | 0.031 | | | | 2.664 | 4.911 | 5.202 | 0.008 | 0.000 | 0.000 |
| Parakeet | 0.015 | 0.015 | 0.015 | 0.001 | 0.001 | 0.001 | 0.491 | 0.431 | 0.472 | 17.434 | 13.161 | 22.187 | 0.000 | 0.000 | 0.000 |

a. Predictors: (Constant), Parakeet
b. Dependent variable: Damage

D1= 0.105 + 0.015 Total parakeet (Year 2018) ($R^2$ = 0.24)
D2=0.251 + 0.015 Total parakeet (Year 2020) ($R^2$ = 0.53)
D3 = 0.162 + 0.015 Total parakeet (Year-2018 and 2020) ($R^2$ = 0.35)

**Table 4:** Effect of morning parakeet on morning damage in experimental plot (Year 2018 & 2020)

| Model | Sum of squares | | | Df | | | Mean square | | | F | | | Sig. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled |
| Regression | 103.216 | 30.031 | 135.415 | 1 | 1 | 1 | 103.216 | 30.031 | 135.415 | 179.223 | 66.933 | 257.313 | 0.000[a] | 0.000[a] | 0.000[a] |
| Residual | 275.284 | 169.600 | 451.538 | 478 | 378 | 858 | 0.576 | 0.449 | 0.526 | | | | | | |
| Total | 378.500 | 199.632 | 586.953 | 479 | 379 | 859 | | | | | | | | | |
| | | | | | | | | | | | | | | | |

| Model | Unstandardized Coefficients | | | | | | standardized Coefficients | | | T | | | Sig. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | | | Std. Error | | | Beta | | | | | | | | |
| | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled |
| 1 (Constant) | 0.168 | 0.483 | 0.277 | 0.063 | 0.081 | 0.049 | | | | 2.662 | 5.997 | 5.603 | 0.008 | 0.000 | 0.000 |
| Morning Parakeet | 0.017 | 0.013 | 0.016 | 0.001 | 0.002 | 0.001 | 0.522 | 0.388 | 0.480 | 13.387 | 8.181 | 16.041 | 0.000 | 0.000 | 0.000 |

a. Predictors: (Constant), MP
b. Dependent variable: MD
c. MD1 = 0.168 + 0.017MP (Year 2018) ($R^2$ = 0.27)
d. MD2 = 0.483 + 0.013MP (Year 2020) ($R^2$ = 0.99)
MD3 = 0.277 + 0.016MP (Year 2018 and 2020) ($R^2$ = 0.59)

**Table 5:** Effect of evening parakeet on evening damage in experimental plot (Year 2018 & 2020)

| Model | Sum of squares | | | Df | | | Mean square | | | F | | | Sig. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | Pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled |
| Regression | 28.247 | 21.331 | 50.766 | 1 | 1 | 1 | 28.247 | 21.331 | 50.766 | 92.861 | 78.016 | 172.348 | 0.000[a] | 0.000[a] | 0.000[a] |
| Residual | 145.401 | 103.351 | 145.401 | 478 | 378 | 858 | 0.304 | 0.273 | 0.295 | | | | | | |
| Total | 173.648 | 124.682 | 173.648 | 479 | 379 | 859 | | | | | | | | | |
| Model | Unstandardized Coefficients | | | standardized Coefficients | | | T | | | Sig. | | | | | |
| | B | | | Std. Error | | | Beta | | | | | | | | |
| | 2018 | 2020 | pooled | 2018 | 2020 | pooled | 2018 | 2020 | Pooled | 2018 | 2020 | pooled | 2018 | 2020 | pooled |
| 1 (Constant) | 0.118 | 0.154 | 0.139 | 0.045 | 0.060 | 0.036 | | | | 2.637 | 2.566 | 3.891 | 0.009 | 0.011 | 0.000 |
| Evening Parakeet | 0.010 | 0.013 | 0.011 | 0.001 | 0.001 | 0.001 | 0.403 | 0.414 | 0.409 | 9.636 | 8.833 | 13.128 | 0.000 | 0.000 | 0.000 |

a. Predictors: (Constant), EP
b. Dependent variable: ED
c. ED1 = 0.118 + 0.010 EP (Year 2018) ($R^2$ = 0.16)
d. ED2 = 0.154 + 0.013 EP (Year 2020) ($R^2$ = 0.33)
ED3 = 0.139 + 0.011 EP (Year 2018 and 2020) ($R^2$ = 0.30)

**Table 6:** Checklist of Bird visiting in experimental plot at Horticulture farm, Anand (Year 2018 & 2020)

| Sr. No | Name of bird |
|---|---|
| 1 | Purple Sunbird *(Nectarinia asiatica)* |
| 2 | Red vented bulbul *(Pycnonotus cafer)* |
| 3 | Pigeon *(Columba liviadomestica)* |
| 4 | Sparrow *(Passer domesticus)* |
| 5 | Indian pea fowl *(Pavo cristatus)* |
| 6 | Black Drongo *(Dicrurus macrocercus)* |
| 7 | Greater Coucal *(Centropus sinensis)* |
| 8 | Common Myna *(Acridotheres tristis)* |
| 9 | House crow *(Corvus splendens)* |
| 10 | Red wettled Lapwing *(Vanellus indicus)* |
| 11 | Red naped Ibis *(Pseudibis papillosa)* |
| 12 | Cattle Egret *(Bubulcus ibis)* |
| 13 | Rose-ringed parakeet (*Psittacula krameri*) |

Out of 20 sampled trees tested, 179.03 mean number of total fruit, 20.98 mean numbers of fruit was damaged and 158.05 mean numbers of fruits were healthy. Average 11.66 per cent damaged fruits per tree were observed while fruit yield was 88.34 per cent. Total weight of damaged fruit and healthy fruit was 68.80 kg and 1630.51 kg, respectively. Other birds also observed in Guava Orchard during study period (Table-7).

**Table 7:** Guava fruits and weight after parakeet predation in experimental plot (Year 2018 & 2020)*

| No. of tree (20) | Number of Fruits/ tree | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total fruit | | | Damaged fruit | | | Healthy fruit | | |
| | 2018 | 2020 | Pooled | 2018 | 2020 | Pooled | 2018 | 2020 | Pooled |
| Total | 3925 | 3236 | 3580.50 | 442 | 397 | 419.50 | 3483 | 2839 | 3161.00 |
| Mean | 196.25 | 161.80 | 179.03 | 22.10 | 19.85 | 20.98 | 174.15 | 141.95 | 158.05 |
| **No. of tree (20)** | **Total weight of fruits/tree (kg)** | | | | | | | | |
| | **Damaged fruit** | | | **Healthy fruit** | | | | | |
| | 2018 | 2020 | Pooled | 2018 | 2020 | pooled | | | |
| Total | 59.11 | 78.48 | 68.80 | 2028.00 | 1233.02 | 1630.51 | | | |
| Mean | 2.96 | 3.92 | 3.44 | 101.40 | 61.65 | 81.53 | | | |
| **No. of tree (20)** | **Number of fruits/ tree** | | | | | | | | |
| | **Damaged fruits** | | | **Healthy fruits** | | | | | |
| | 2018 | 2020 | Pooled | 2018 | 2020 | pooled | | | |
| Total | 222.52 | 243.86 | 233.19 | 1777.48 | 1756.14 | 1766.81 | | | |
| Per cent | 11.13 | 12.19 | 11.66 | 88.87 | 87.81 | 88.34 | | | |

*In year 2019, trees were pruned to manage bark eating caterpillar infestation and as a result the experiment was not possible to conduct

## Conclusion

Difference in bird visitation during evening and morning period was found statistically significant. The fruit damage was recorded 0.97 % and 0.54 % in morning and evening period, respectively. The regression equation predicted for the parakeet visit in morning and evening on guava was indicated a positive relationship between the parakeet visit and depredation in the morning and evening. Out of 20 sampled trees tested, 20.98 mean numbers of fruit was damaged and 158.05 mean numbers of fruits were healthy. Total 419.50 numbers of fruits were damaged with 68.80 kg weight loss from twenty sampled trees. Average 11.66 per cent damaged fruits per tree were observed due to parakeet depredation.

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