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Foraging behaviour of damage-causing birds in table grape vineyards in the Orange River Valley, South Africa

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• The authors believed that a thorough understanding of birds' *foraging behavior* –involving both grapes as well as other foods - could help develop a strategy to mitigate bird damage in the vineyard. To this end, they conducted this study seeking answers to the following questions:
1) does foraging frequency on grapes change throughout the harvest period?
2) do birds preferentially feed at selected times in the day?
3) do birds feed at selected positions on the clusters?
4) what foraging strategies do birds employ – what do they feed on- when not feeding on grapes?

• How were the researchers going to find all of these details of bird behavior? Their approach was to observe the birds' foraging behavior in a large number of table grape vineyards located in the Northern Cape Province, South Africa. More specifically, for each *foraging act* observed –of either a single bird or a distinguishable flock- they recorded:
- type of food item eaten
- foraging strategy or maneuver employed (foraging on the ground, hawking in the air, gleaning from litter, etc)
- the position on the cluster the birds fed on
- the time of the day (within each of four predefined 3-hour intervals)

• The researchers were able to record a total of 11 bird species: 5 "mixed feeders", 4 "granivores", and 2 "frugivores" (see table in original text for common names). The majority of them were resident birds, with only one nomadic species (a granivore).

• Based on the 318 foraging acts recorded, the authors found the following answers to the above questions:
1) **Feeding frequency throughout harvest**: Birds fed more frequently early before harvest (November) than in December and January, despite the fact that only 13% of the vineyards bore ripe grapes. Also, as the season progressed, mixed feeders and granivores turned from feeding on *grapes* to feeding on *insects and seeds*. To the authors, this was the most remarkable finding of this study.
2) **Feeding pattern throughout the day**: Birds fed mostly in the late morning (9am to 12pm), followed by the early morning (6 to 9am), and then the late afternoon (3 to 6pm).
3) **Feeding pattern on the cluster**: Birds fed mostly from the top of the cluster (50% of times) while perching on top of it - rather than the side or the bottom.
4) **Foraging strategies**: Researchers could observe a wide variety of strategies not related to grape feeding. For example, "River white-eyes" tended to mostly glean insects from vine bark and leaves; "African red-eyed bulbuls" tended to hawk insects in the air; whereas "Karoo thrust", "Cape sparrow", "Southern red bishop", "white-throated canary", and "yellow canary" foraged exclusively on the ground.

- Some tips for growers derived from this study might include:

_ deterring devices that rely on visual or auditory signals need only be operative during mornings and late afternoons;

_ grasses and weeds in the interrows may enhance the attractiveness of vineyard blocks to granivores – which, after establishing a feeding pattern, could potentially turn to grapes and exacerbate the damage;

_ identifying flight paths used by birds into the vineyard may help pinpoint the areas of the vineyard most susceptible to damage in which to concentrate the mitigating devices.

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