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## Bee Pollination and Coffee Production in the Context of Various Management Practices

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### Abstract

Agricultural productivity, particularly in the tropics, is at least partially dependent upon natural ecosystem services such as pollination, pest control, and water and soil conservation. While empirical studies have shown that the productivity of coffee is enhanced by insect pollination, rarely have management practices been included in such analyses. This omission means that the value of pollination services cannot be set within the range of management interventions available to farmers. Without this broader context it is difficult to evaluate how farmers might respond to calls for managing land to secure pollination services. In Kodagu, a major coffee-growing region in southern India, we investigated the contribution that insect pollination makes to coffee production in the context of fertilisation, irrigation and shade management interventions, as well as environmental variables.

Our results show that even taking into account management decisions, bee abundance contributes more to coffee production in terms of number of berries harvested than other management practices, such as liming. Bee abundance, however, is highly contingent upon management actions, particularly irrigation, rather than the nature of the surrounding habitat matrix. Raising awareness among coffee growers of the role of asynchronously irrigating can potentially contribute to improved quantity and quality of coffee yields.

**Keywords:** Bee pollination, *Coffea canephora*, ecosystem services, irrigation, management practices, production