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#### Farming with Alternative Pollinators (FAP) in large scale fields



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This brochure is for large-scale farmers producing in monocultures. We show fields and field results from three regions with different climate: Settat (semi-arid, 90% of arable land is covered with cereals), Sidi Slimane (sub-humid, fruits and vegetables) and Ksar El-Kebir (mediterranean climate, producing mainly melon and sugarcane).

The three regions are rich in bee fauna, but the intensive agriculture might reduce their diversity and abundance hampering agriculture in the near future.

### Enhance the diversity of crops and attract more pollinators to your fields!



#### Thus you can enhance your production



Marketable habitat enhancement plants (oil seeds, vegetables, spices, fruit trees etc.) enhance faba bean production, pest control, and your net income

#### Coriander

15 m

1 m

Canola



100 m

Main crop: Faba bean Cultivar: Local variety Seeding times Late November: Canola, Coriander Late November: Faba bean

#### Marketable habitat enhancement plants enhance melon production, pest control, and your net income

 Sunflower
 Canola
 Condet

100 m

15 m

1 m

Main crop: Melon Cultivar: Hoda Seeding times

Coriander

First March: Canola, Coriander, Sunflower First March: Melon

#### Marketable habitat enhancement plants to enhance pest control in wheat fields



203 m

Main crop: Wheat Cultivar: Wafia Seeding times Late November: Canola, Coriander Late November: Wheat

## Diversified fields attract and conserve free-of-charge labour force













These beneficial animals cannot survive on long term in current monocultures



Bumblebees pollinate effectively faba bean, vegetables and fruits. They are social bees. The queens remain sleeping in ground holes during the summer. In autumn, they initiate new colonies in abandoned burrows of mice. Protect the queens and their nesting areas to benefit from good pollination service.







Large carpenter bees pollinate effectively eggplant, cucurbits and vegetables. They are solitary cavity nesters bees. The adults overwinter individually, often in previously constructed brood tunnels in dead wood. Protect and provide nesting materials (e.g., dead wood, drilled holes into wood, or even plastic tubes ...) to benefit from good pollination service.







Flower-bees pollinate effectively faba bean and other legumes. They are solitary ground nesting bees that establish their deep burrow in vertical embankments with mixed clay and sand. Create areas of bare banks and protect these bees from tillage to benefit from good pollination service.







Banded bees are effective pollinators of cucurbits and vegetables. They are solitary bees that excavate nests in the soil sometimes on flat ground but more often in vertical clay banks. Create areas with bare embankments and protect the offspring from tillage and the harmful farming practices and chemical amendments to benefit from good pollination service.





Long-horned bees are effective pollinators of faba bean and arugula. They are long tongued, ground nesting solitary bees. They burrow vertical cells at the end of a rather long lateral gallery. Create patches of bare soil and protect the offspring from tillage, harmful farming practices and chemical amendments to benefit from good pollination service.





Furrow bees pollinate effectively cucurbits like melon, zucchini and pumpkin. They are solitary ground nesting bees that establish their nests in soils with mixed clay and sand. Create areas of bare grounds and protect these bees from tillage to benefit from good pollination service.







In contrast to bees, whose larvae feed on pollen, the larvae of digger wasps contribute to pest control. The female wasp searches for beetle larvae in the soil. Once found, she paralyzes the larvae and lays an egg on them. Wasp larvae then consume the living beetle larvae. As adults, digger wasp support farmers by pollinating crops.



Syrphid flies are very important. They are effective pollinators, and additionally the larvae of many syrphid species are also natural enemies of major crop pests. Some groups of flower flies lay their eggs on plants near aphid colonies. After hatching, the larva becomes a fierce predator of these aphids.







Ladybird beetles are predators. They feed themselves on aphids and many other pests of cereals, vegetables, oilseeds, and various fruit trees. Female lays her eggs under plant leaves. After hatching, the larvae and adults become a fierce predator of many aphids.







Seven spot ladybirds are one of the most important natural enemies of many pests in different crops. Female lays her eggs under plant leaves. After hatching, the larvae and adults become an effective predator of many aphids.



# In our large-scale field trials, FAP farmers had an **average net income**

## 37% higher from faba bean,14.5% higher from melon, and1.5% higher from wheat



FAP farmers also achieved a high number of fruits with good quality in faba bean and melon. Additionally, the diversity and abundance of pests in the three main crops decreased.







In Morocco, 70% of wild bees nest in the ground. Tillage, pesticides and heavy machinery can destroy their nests. As Morocco has limited rain, the risks related to pesticides are even higher than in many other countries.





### Use FAP planting designs and protect pollinators





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