

Bee Pollination Increases Yield and Quality of Cash Crops in Burkina Faso, West Africa

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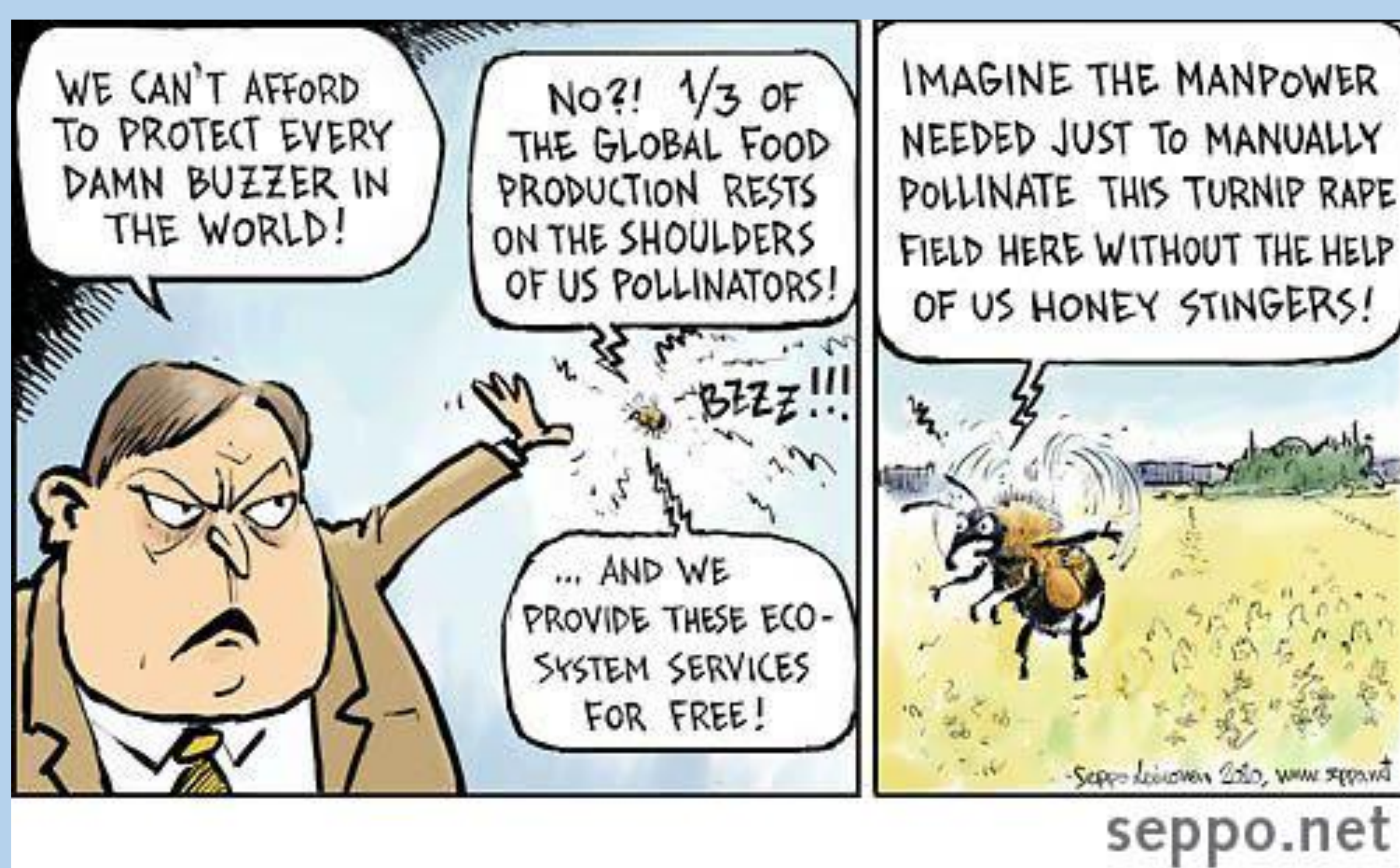
INTRODUCTION

- Insect pollination is an ecosystem service of global importance, providing significant economic benefits to human society (Winfree et al. 2011)
- Bees are the most important pollinators worldwide (Greenleaf and Kremen 2006)
- Cotton and sesame are major cash crops of Burkina Faso (cotton export = 60% of GDP) (FAO 2013)
- The contribution of bee pollination for crop yield of these crops in Burkina Faso are unknown

HIGHLIGHTS

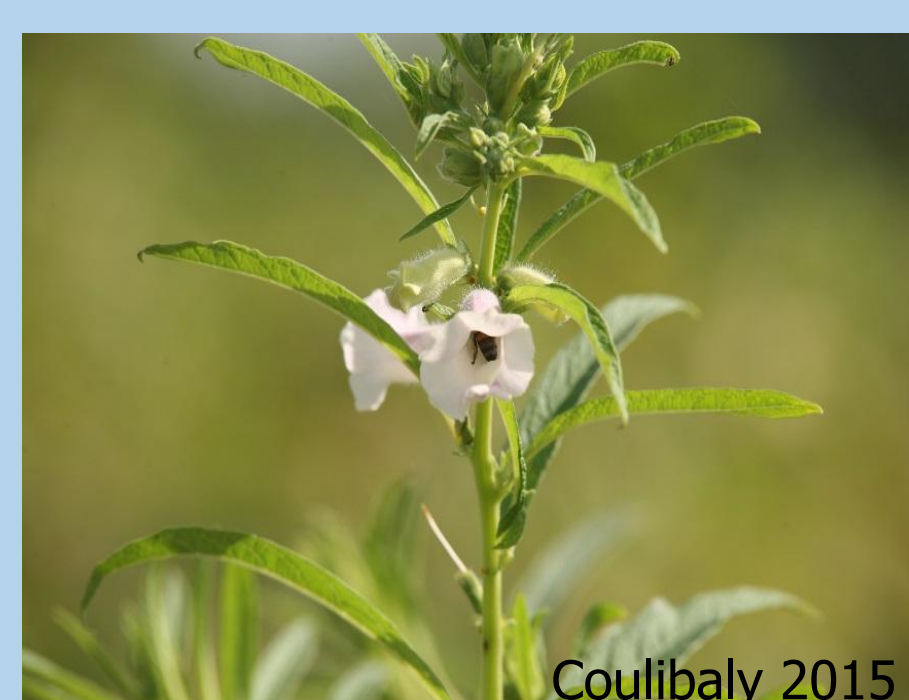
- Self-pollination revealed inbreeding depression of fruit set and F1-Generation
- Honeybees and wild bees are the most effective pollinators of cotton and sesame
- Pollination by bees significantly increased yield quantity and quality
- African smallholders benefit from the gratis ecosystem service of bee pollination

RESULTS



METHODS

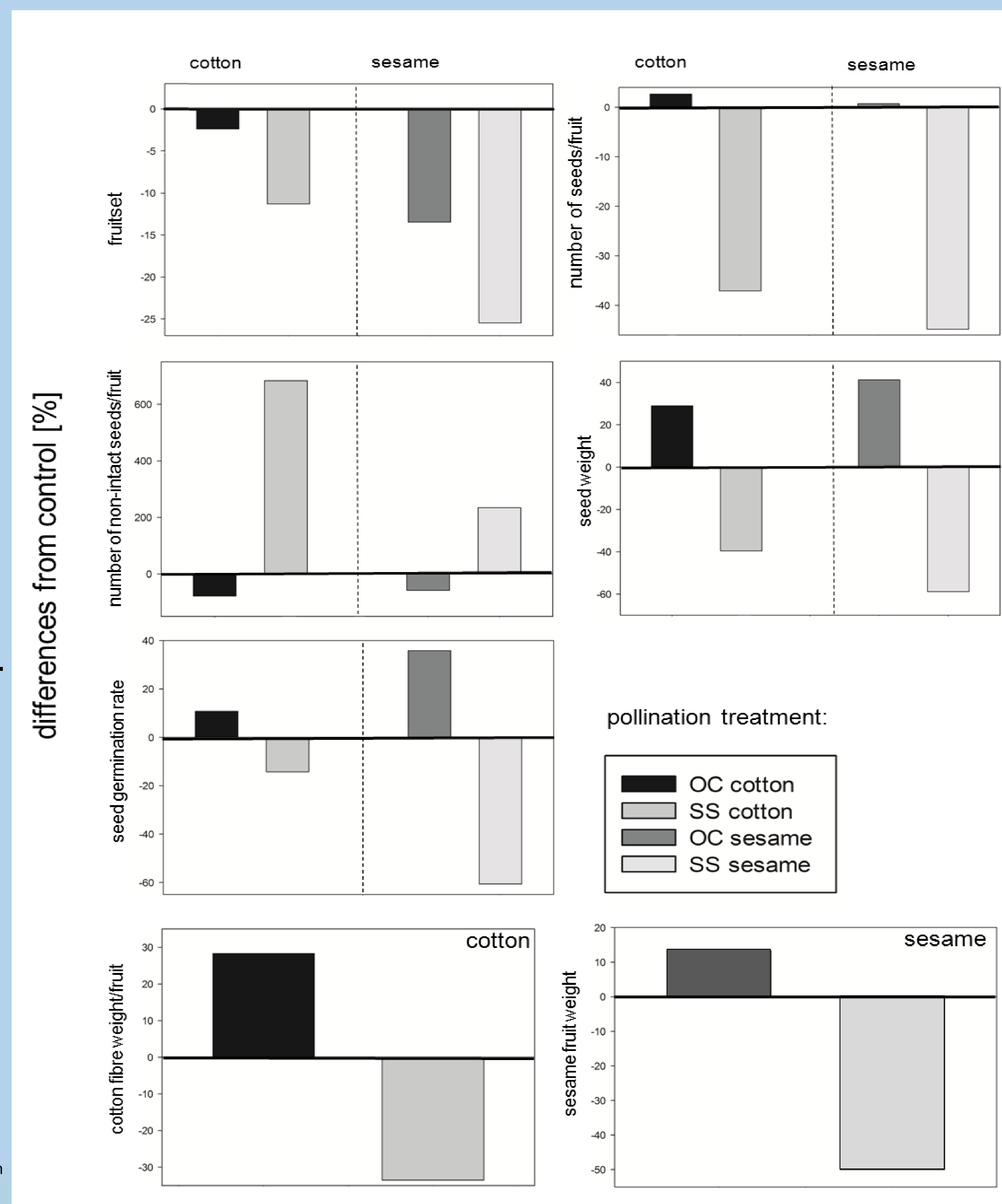
- Study site: South-West Burkina Faso (Nazinga, Dano, Bontioli)
- Levels of pollinator dependences/selfing rate of cotton and sesame determined with **outcross (OC)** and **spontaneous self-pollination (SS)** experiments; plus control = open pollination, no treatment
- No. flowers = 550/treatment/crop, 11 fields of cotton and sesame
- Most effective bee pollinators determined in terms of fruit set and fruit quality
- Test for inbreeding depression through self-pollination via germination experiments of F1- seeds



OC = pollen delivered by bees, Bee visiting a sesame flower

SS = self-pollination, pollinator exclusion, ex. cotton flower

Tetralonia fraterna (long horned bee), most effective wild bee pollinator of cotton



CONCLUSION

- Cotton and sesame are able to produce fruits via self-pollination, but benefit from outcross-pollination by bees
- Exclusion of pollinators (pure self-pollination): Yield gap of 37% in cotton and 59% in sesame
- Pollination by bees: Increase of cotton fiber weight by 62%, Seed weight of sesame tripled
- Gratis pollination service by bees was thus beneficial for smallholders
- Natural savanna habitats should be conserved to maintain vigorous bee populations and hence the ecosystem service of pollination

References

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- Greenleaf, S.S., Kremen, C., 2006. Wild bees enhance honey bees' pollination of hybrid sunflower. Proc. Natl. Acad. Sci. U.S.A. 103, 13890-13895.
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- Cartoon: <http://www.seppo.net/cartoons/displayimage.php?album=search&cat=0&pid=850>