



seed **madagascar**
sustainable environment, education & development



End of Phase I Report for

PROJECT RENITANTELY

Developing beekeeping as a sustainable livelihood

October - 2019

Executive Summary

Madagascar is one of the least developed countries in the world; with 78% of the population surviving on less than US\$1.90 per day, it has the highest rate of people living in extreme poverty globallyⁱ. More than 84% of the rural population rely on subsistence agriculture for their livelihoodsⁱⁱ, but rapid population growth of 2.8% per yearⁱⁱⁱ is rendering traditional income generation activities of this kind increasingly inadequate.

Between September 2016 and August 2019, Project Renitantly worked to diversify livelihoods by building the capacity of beekeepers across six rural communities. The project aimed to improve modern beekeeping skills to improve honey yields and quality, enhance pest prevention and treatment, and strengthen routes to market for beekeeping products.

The period covered in this report (August 2018 - August 2019) saw the continuation of training workshops for all project beekeepers, cross-visits to a large apiary, the distribution of key beekeeping equipment and the establishment of exciting partnerships with leading research institutions.

In August 2019, the project team undertook the endline survey with project beekeepers across the six target communities. The results found high levels of understanding of key beekeeping skills, especially amongst beekeepers recruited in project year 1, as well as increases in average honey yields, a 158% increase in the average sale price of honey, and a significant diversification in primary livelihood activities amongst project participants.

1 Activity Detail (August 2018 - August 2019)

This report covers activities undertaken from August 2018 to August 2019; for further detail on project activities up to August 2018, please see the '[Project Renitantly Year 2 Annual Report, September 2018](#)'¹.

1.1 Beekeeper Skills Training

Since August 2018, the SEED project team has continued to work with 78 beekeepers across six rural communities to further develop modern beekeeping skills. Workshops facilitated during this period are highlighted below (2.1.1 - 2.1.7).

1.1.1 Hive building

During this workshop, hive building materials were provided to third-year intake beekeepers and each beekeeper constructed one hive under the supervision of the technicians. All materials used were easily accessible and affordable for beekeepers in rural communities. This ensures that beekeepers are able to grow their apiaries by building new hives themselves rather than relying on expensive purchased hives. Additionally, all beekeepers, including the first- and second-year intakes, were given materials and instructions for building frames for their hives. This was in response to an issue identified by the beekeepers that in their top-bar hives wax often breaks off, sometimes causing bees to abscond.



Beekeepers participate in a hive building workshop (left) and two Beekeepers with a newly built hive (right)

¹ <https://madagascar.co.uk/projects/sustainable-livelihoods/renitantly>

1.1.2 Populating hives

After constructing hives, beekeepers were instructed on how to populate their hives using various methods. The workshop saw beekeepers learn how to catch swarms and wild colonies, how to use empty “bait hives” to attract swarms, and how to split healthy colonies to create more.

1.1.3 Healthy hives

In the healthy hives training, beekeepers were taught how to troubleshoot common beehive issues. They learned which environments are best for positioning hives, how to maintain their apiaries to prevent bees from absconding, and how to feed the bees with sugar water during times when a lack of natural forage can lead to starvation and abscondment.

1.1.4 Honey and wax harvesting

During this interactive workshop, beekeepers visited a hive, examined the honey stores, and were trained to only take capped honey for harvest. They also learned how to crush the wax and strain the honey through a sieve and a thin cloth to filter out debris. The wax was then melted, and the technicians demonstrated two common methods for wax harvesting that can be performed using locally-available resources.

1.1.5 Varroa management training

This workshop taught beekeepers mechanical and herbal methods for eliminating varroa. Beekeepers were trained how to remove drone (male bee) larvae, since varroa breeds faster in these cells, so removing them can knock back mite levels. The technicians recommended local herbal treatments, including thyme, which is easily available and has been used globally for varroa management. In addition, the technicians worked with beekeepers on understanding varroa resistance, and encouraged them to split hives which display an ability to cope with infestations, since these are genetically favourable. Correct Apistan (a chemical treatment) use was reviewed, with beekeepers learning that Apistan should only be used as a last resort and not be left in hives for longer than necessary, in order to limit the negative impacts that the chemical can have.

1.1.6 Recap workshops

In response to feedback from beekeepers requesting a review of past workshops, two recap workshops were included in the curriculum, six months apart. These were designed to be highly interactive, and included quiz questions for beekeepers to answer, miniature hives for hive splitting demonstrations, and additional visual resources where beekeepers practised locating the queen, identifying problems with hives, and differentiating between honey that was ready to be harvested and that which was not. This reinforced information already covered, and brought to light topics requiring further attention from the technicians in the final months.

1.1.7 Visual Learning Aids (VLAs)

SEED's International Beekeeping Specialist developed a new set of VLAs to complement Year 3's training workshops. The VLAs used intuitive imagery and minimal wording to explain a variety of beekeeping skills and knowledge areas in a way that overcomes high levels of illiteracy. These included sustainable varroa treatment (removal of drone comb, resistance by bees), a calendar of beekeeping events based on seasonality, and keeping hives healthy (feeding bees sugar water, and identifying hives in good and poor condition).



A selection of VLAs developed in Year 3

1.2 Additional Activities

1.2.1 Beekeeping and gender equality

Establishing beekeeping as an income-generating activity for women in rural communities is a key element of Project Renitantly. In the Anosy region, beekeeping is not principally seen as a male-dominated income generating activity, as other activities such as sea fishing are. This leads to significant potential for women to participate in project activities and build capacity as beekeepers.

Following gender equality workshops held at the end of Year 2, which aimed to build understanding within communities about the benefits of beekeeping for both men and women, the team held exclusively female focus groups in target communities in February 2019. The groups were able to candidly discuss their experiences and the benefits of beekeeping for women, with all groups reporting that they did not feel women face any gender-specific beekeeping challenges.

1.2.2 Cross-visit

In March 2019, the team conducted a cross-visit for all beekeepers to the apiary of Firmin, an experienced beekeeper with over 120 hives located in Mondromondromatra, a village close to all target communities. Firmin delivered a presentation about beekeeping practices, after which the beekeepers visited his hives and practised removing a frame of bees and looking for the queen. The technicians and Firmin encouraged everyone to be engaged and would call on those beekeepers with less experience to try hands-on practice. The cross-visits were excellent for reinforcing information covered in the workshops and for encouraging collaborative discussion about beekeeping. A further positive impact of the visit was that the beekeepers were inspired by how profitable beekeeping had been for Firmin, and felt encouraged to invest their money earned from beekeeping back into equipment to grow their own beekeeping enterprises.



Experienced beekeeper Firmin shows Renitantly participants his hives

1.3 Equipment Distribution

In Year 3, the project met all remaining equipment needs of the beekeepers. Hive materials and suits were distributed to Year 3 intake beekeepers, and equipment for one frame was distributed to all beekeepers. Additionally, at the honey harvest training, all beekeepers received: a bucket, a sieve, a small cut of thin cloth for filtering, and a funnel for bottling honey. For wax harvesting, they received: a small metal bowl and cup for heating up wax.

1.4 Routes to Market

A key aspect of Project Renitantly is developing secure routes to market that provide project beekeepers with a fair and sustainable marketplace for their honey and beeswax. SEED secured formal agreements with two local honey and beeswax product retailers (Honey and Soga and Natur'l) in June 2017 which resulted in set sale prices of 7,000 MGA per litre of honey and 10,000 MGA per kilogram for beeswax. This compares to prices of 3,000-4,000MGA commonly achieved in rural markets. The honey sale price was later re-negotiated to 8,000 MGA per litre in February 2018.

1.4.1 Honey and Soga community visits

After analysing data gathered during the 2018 annual survey, it was found that beekeepers in Fara Fara Vatambe were selling honey to Honey and Soga at a far higher rate than any other community. This had been the one community that the Honey and Soga team had visited before this project year. Recognising a link between sales to Honey and Soga and their visits to communities, the SEED team visited all communities alongside representatives from Honey and Soga in October 2018. The President and Vice President met all the beekeepers, explained the advantages of selling to them at their guaranteed rate of 8,000 Ariary per litre and shared contact information.

1.4.2 B2B conference

In May 2019, Renitantly's Project Coordinator and SEED's Head of Environment, Conservation and Sustainable Livelihoods attended the B2B conference in Antananarivo organised by GIZ (a German development agency) and the Malagasy Honey Platform (PAPIM). The conference discussed opportunities for improving value chains for agricultural products, including honey, in southern Madagascar. SEED's representatives gathered valuable information on a range of topics including the importance of conforming to product standards, how to obtain organic certification, and the steps and resources necessary for exportation, all of which will be useful for a potential second phase of Renitantly as the project seeks to expand market opportunities for beekeepers.

2.5 Focus on: Research Partnerships

In January 2019 SEED secured a partnership with Cornell University's Dyce Honeybee Lab which saw Dr. David Peck, a leading researcher in the field of behavioural interactions between honeybees and varroa mites, join the Renitantly team between March and May 2019. During this time, Dr. Peck experimented on project hives to investigate whether the endemic Malagasy honeybee *Apis mellifera unicolor* is developing resistance to varroa mites, as had been anecdotally reported by some Renitantly beekeepers.

Preliminary results (full results are due to be published in late 2019) from Dr. Peck's research indicate that some hives have demonstrated characteristics of varroa resistance. This is significant not only for its scientific interest to Dr. Peck, but also because it presents SEED with the opportunity of tackling the impact of varroa in an entirely new way in a possible second phase of the project: a breeding programme designed to accelerate the growth of varroa resistance.

Such a programme would involve training beekeepers to identify hives exhibiting varroa resistance characteristics and then grafting queens from these hives to put in new hives and spread the varroa-resistant genes. The structure and implementation of the breeding programme will be designed by SEED's International Beekeeping Specialist alongside Dr. Peck and another leading researcher from the Swedish University of Agricultural Sciences who will act as a consultant. This will ensure international best practice is combined with local expertise to create an effective and contextually appropriate varroa management method.

The prospect of varroa-resistant bees in Madagascar is cause for great optimism. Free from the damage caused by the parasite, beekeepers would see honey and wax yields increase and their livelihoods become more secure.



Dr. David Peck examines a frame of wax (left) and Beekeeping Technician Houssmann practices queen grafting technique (right)

2 Monitoring, Evaluation, and Learning

2.1 Methodology

To assess progress towards Project Renitantly's outcomes and indicators, the project used data collected during annual surveys on individuals' apiculture skills, beekeepers' demographic data, varroa infestation and management monitoring, and honey yields and sales.

2.1.1 The endline survey

In August 2019, the endline survey was conducted in all six target communities over a one-week period. The survey used a short-answer questionnaire format, and for the skills assessment, key points were ticked off as beekeepers mentioned them. The endline survey was conducted with 66 of the 78 project beekeepers; the remaining 12 reported illness or were not in the area at the time. Data from absent beekeepers relating to their demographics and hive numbers has been used from monitoring trips taken in the weeks before the endline survey was conducted. Since the data collected in the endline survey questionnaires was self-reported, it is limited by the potential for biased or untruthful answers.

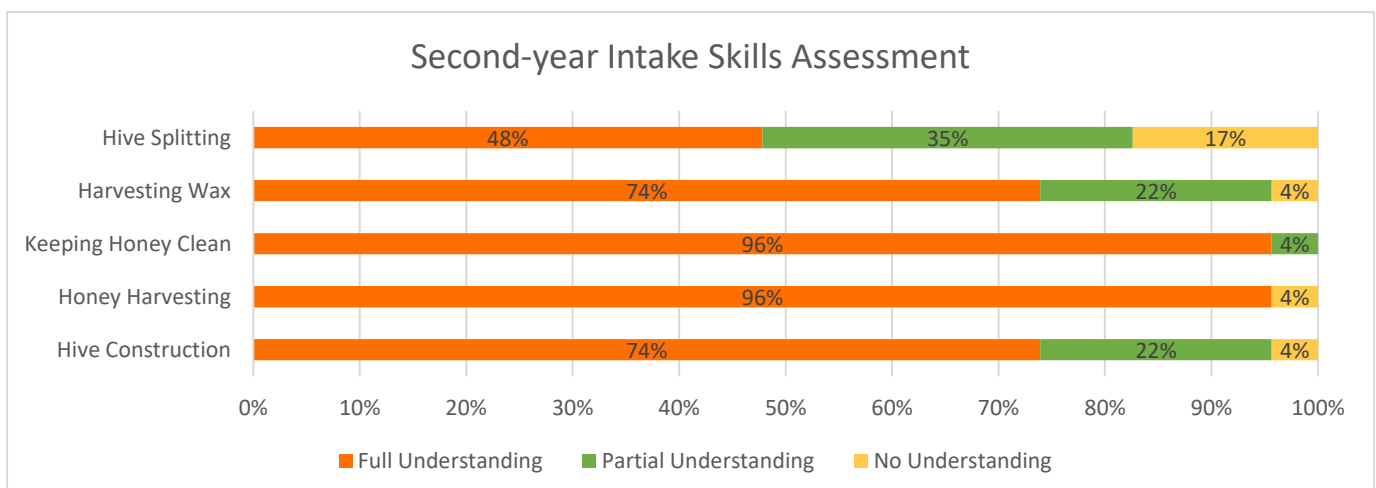
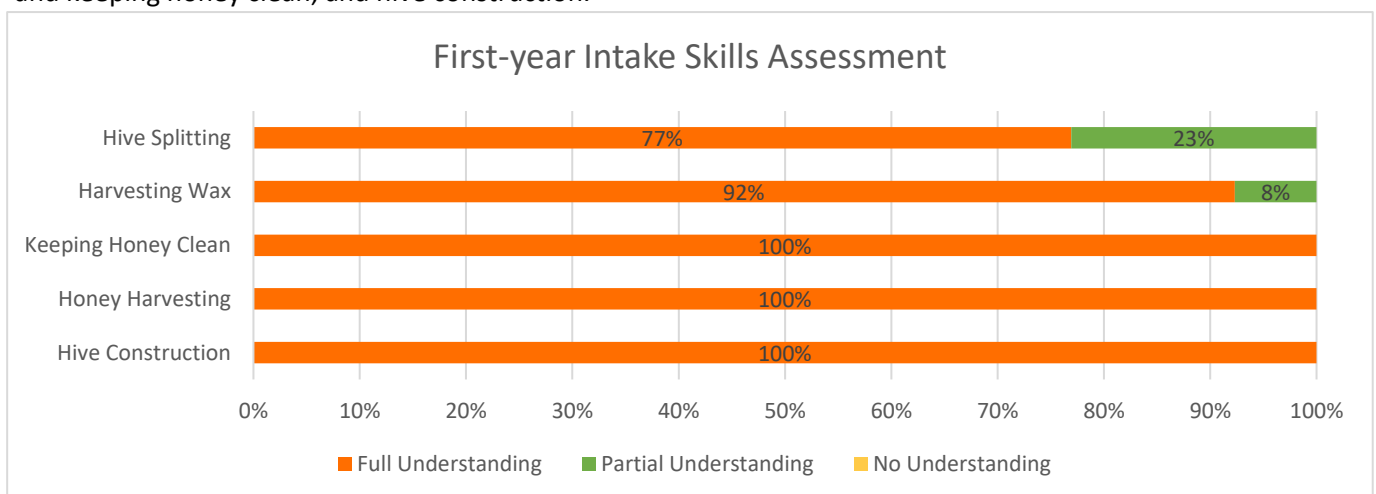
2.2 Project Beekeeper Demographics

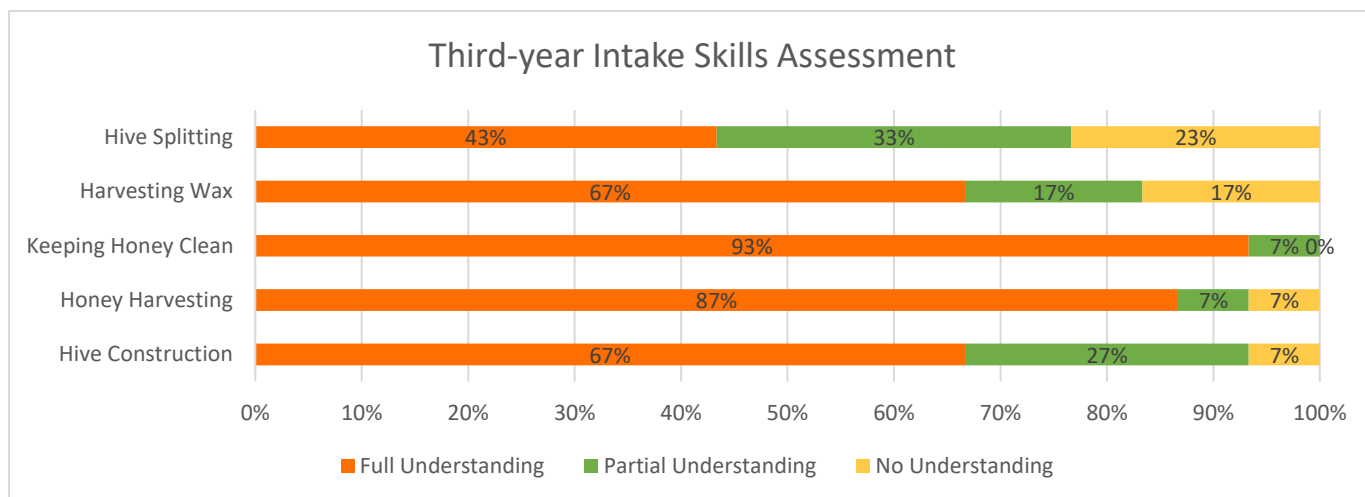
Following a small number of beekeepers leaving the project and being replaced during Year 3, beneficiary demographics were assessed as follows:

- 38% female representation amongst all project beekeepers, and 62% amongst the third-year intake
- The average age of project beekeepers was 46. The oldest beekeeper was 74 and the youngest 20 years old
- 392 household dependents supported through beekeeping-generated income, of which 205 are under 18

2.3 Apiculture Skills Assessment

The endline survey included an assessment of the specific skills taught during the training workshops held over the course of the project. Questions were asked about skills including hive splitting, wax harvesting, harvesting and keeping honey clean, and hive construction.





As expected, first-year intake beekeepers have the highest overall understanding, since each has attended training workshops for all three project years. Across all skill sets, first-year beekeepers have solid understanding. Although lower, levels of understanding amongst second- and third-year intake beekeepers are also very encouraging, given their reduced time on the project. Particularly positive is the extent of their knowledge surrounding honey harvesting and keeping honey clean, with even third-year intake beekeepers recording 87% and 93% respectively.

Of more concern are the high levels of partial and no understanding seen for harvesting wax and particularly for hive splitting amongst both second- and third-year intake beekeepers. One possible reason for the low knowledge retention in these areas is simply that these skills are the most technical, with hive splitting having several crucial steps to follow in order to be executed correctly. In addition, while markets exist for honey within beekeepers' own communities, the same demand does not exist for wax products, which would likely need to be transported long distances to be sold. This could reduce motivation for beekeepers to practice and therefore retain knowledge of this particular skill.

2.4 Beekeeper Income

In order to examine the economic impact of beekeeping since the start of the project, the team analysed changes in hive numbers, honey yields, sale price of honey, routes to market, and livelihoods diversification.

2.4.1 Hive numbers

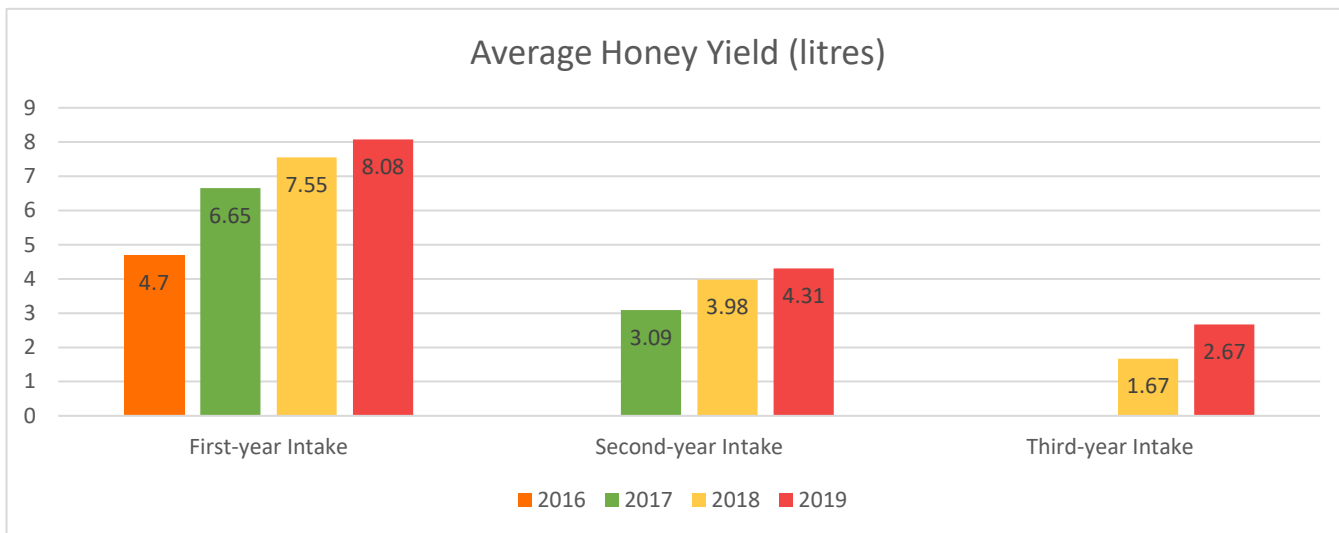
Over the course of the project, each cohort of beekeepers has significantly increased their number of populated hives. First-year intake beekeepers recorded a 244% increase in the average number of populated hives per beekeeper since 2017 (populated hive data was not recorded during the 2016 baseline survey), while the increases for second- and third-year intake beekeepers has been 156% and 233% since their respective baselines.

The fact that total hive numbers have been increasing alongside an increase in the proportion of total populated hives could be attributed to the success of hive-building training and 'keeping hives healthy' workshops which train beekeepers how to prevent colonies absconding from their hives.

2.4.2 Honey yields

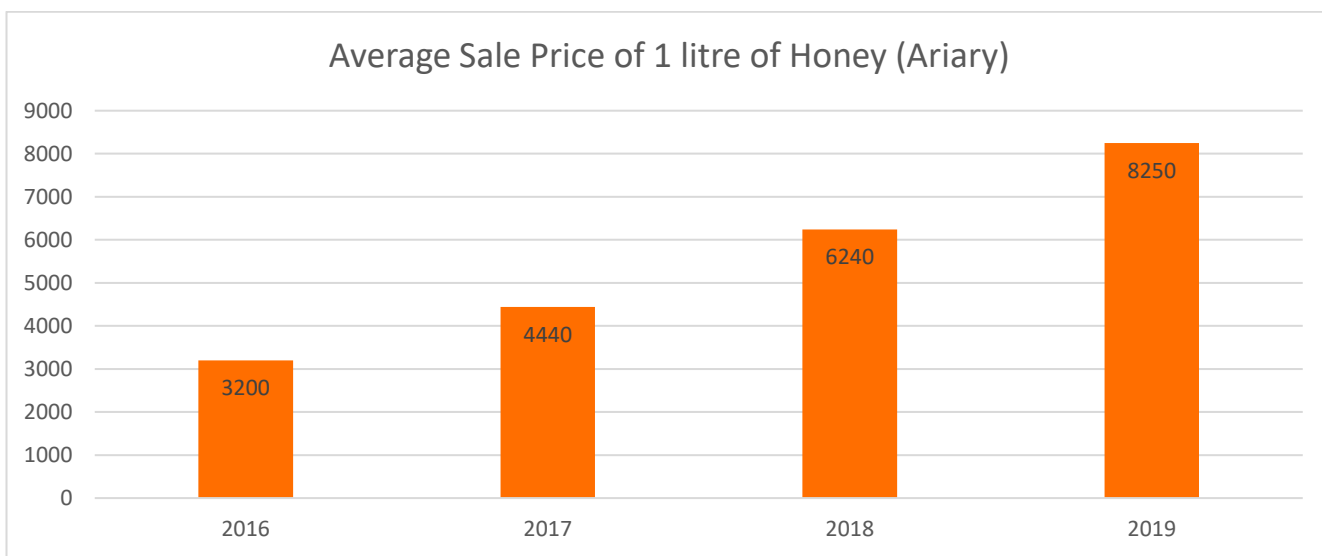
With more hives to harvest from, each cohort of beekeepers has also seen an increase in honey yields since their respective baselines. First-year intake beekeepers have seen their average yields increase by 72%, second-year intake by 39% and third-year intake by 60%. The results for third-year intake were originally heavily skewed by a single outlier who reported exceptionally high yields in both 2018 and 2019. Were the outlier to be included the respective average yields for third-year intake beekeepers would be 3.33l and 7.75l in 2018 and 2019 respectively.

Graph to show average recent honey yields of beekeepers harvesting honey



2.4.3 Sale price

The average sale price achieved by project beekeepers has risen by 158% since baseline. The steady increase in price each year reflects both the increase in quality of honey brought about by improved harvesting techniques and the access to more lucrative routes to market. At baseline, beekeepers could expect just 3,200 MGA per litre of honey, whereas by 2019 this had risen to 8,250 MGA.

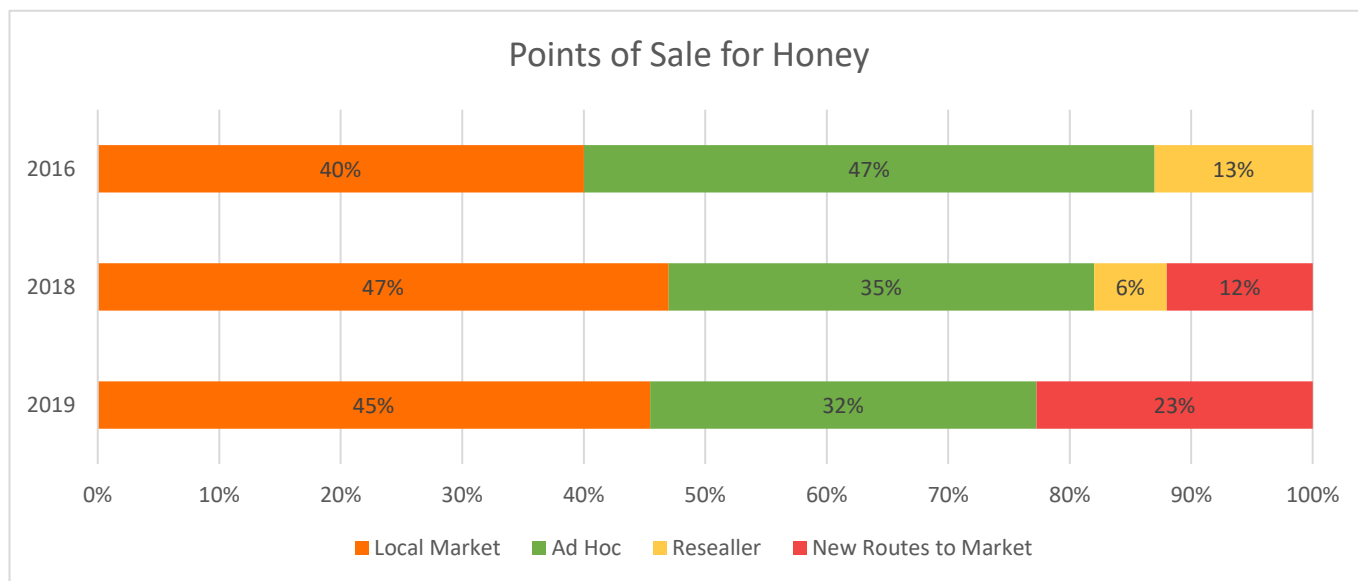


2.4.4 Points of sale

Since the start of the project, points of sale for project beekeepers have continued to diversify. Initially, 47% of honey sales were ad hoc, 40% were to local markets, and 13% were to resellers. By the end of the project just 35% of sales were ad hoc, 45% to local markets, 0% to resellers, and 23% to new routes to market. Notably, the proportion of sales to traditional local markets has remained relatively consistent, demonstrating the ongoing importance of local points of sale despite improved access to new routes to market.

Surprisingly, whilst in 2018 sales to Honey and Soga made up most of the sales to new routes to market, in Year 3 no beekeepers sold to the retailer. One reason for this is that the average sale price for honey has now surpassed the sale price agreed between Honey and Soga and Renitantly beekeepers of 8,000 MGA per litre, creating a weaker incentive to sell. The second reason is that in the past year additional new routes to lucrative markets have opened up, including selling to the luxury Manafiafy Lodge in Sainte Luce.

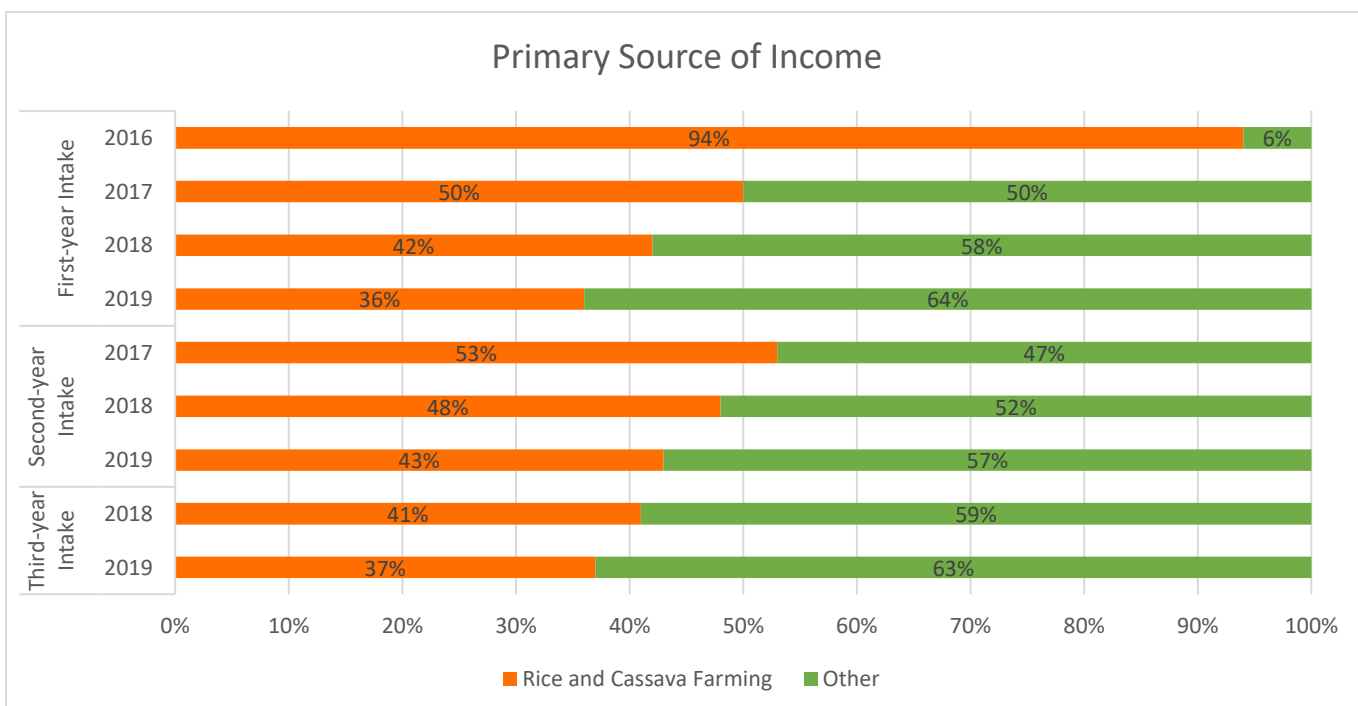
Following the discovery that no beekeepers had sold to Honey and Soga, the Renitantly team initiated a potential renegotiation of the agreed sale price to reflect the changing market conditions. It is hoped these talks will revitalise the relationship with the retailer.



2.4.5 Livelihood diversification

The diversification of primary income sources for project beneficiaries is used as a proxy for the improved sustainable livelihoods development through Project Renitantly. With the majority of the population of the Anosy region wholly reliant on subsistence farming, additional sources of income are vital for providing more financial security. Other income sources identified during surveys include: farming high-value crops (coffee, banana, sugarcane, oranges); breeding livestock; weaving; and working in additional occupations such as teacher, shopkeeper, nightguard, and local politician.

The 2019 endline survey indicates that most of the first-year intake of beekeepers have significantly diversified their income, with a 58% decrease in beekeepers reporting rice and cassava farming as their primary livelihood since baseline. Second- and third-year intake beekeepers demonstrated a similar pattern, albeit with a higher diversity of livelihoods evident at baseline, with reductions of 10% and 4% in the proportion of people for whom rice and cassava farming is a primary livelihood respectively.



One example of a beekeeper who has significantly diversified his livelihood since being on the project is Perosy, 39, from Tsagnoriha. When Perosy joined the project in the first intake he had just one year of beekeeping experience and relied mostly on rice and cassava farming to support his two young children. Beekeeping at the time provided just a limited supplemental income.

In 2016, Perosy described his biggest problem with beekeeping as a lack of hives, which limited his ability to increase his yields and income. Thanks to comprehensive hive-building training workshops, Perosy can now build his own hives instead of having to invest large amounts of money into purchasing them from elsewhere. This has enabled him to quadruple the number of hives in his Apiary and drastically grow his honey yields.

Perosy has been wise with his additional income generated through beekeeping. He now pays others to work in his rice and cassava fields, significantly improving his quality of life. In addition, Perosy has invested a portion of his earnings into opening a shop next to his home as well as obtaining more beekeeping materials to further scale up his enterprise. By successfully diversifying his livelihood in this way, Perosy has been able to ensure his family's future is more financially secure.



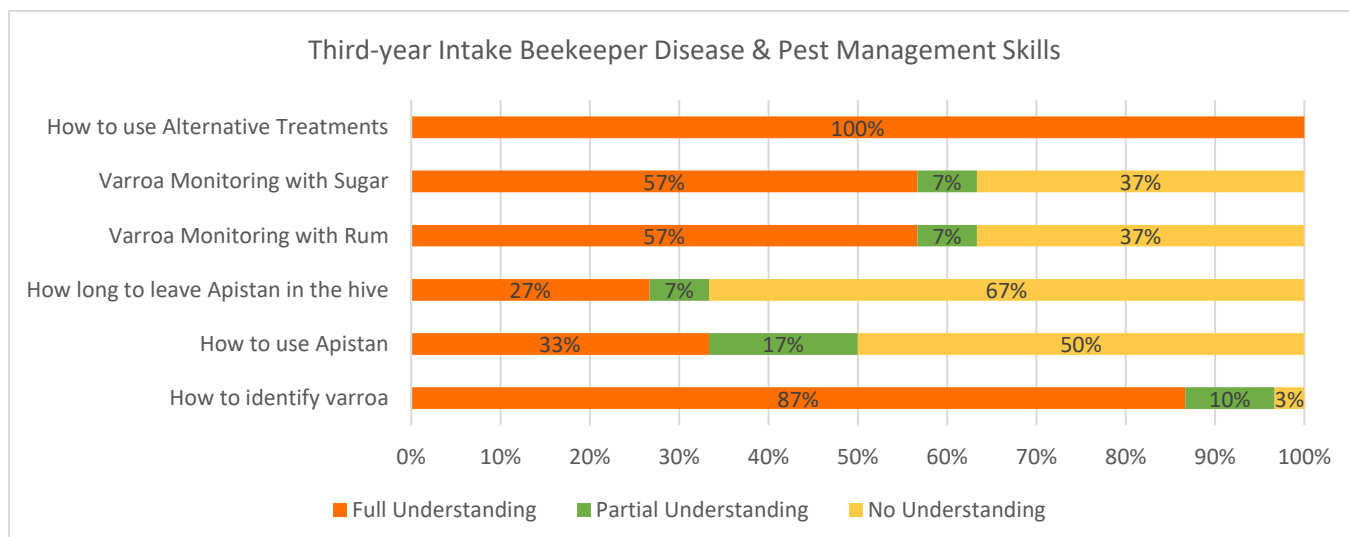
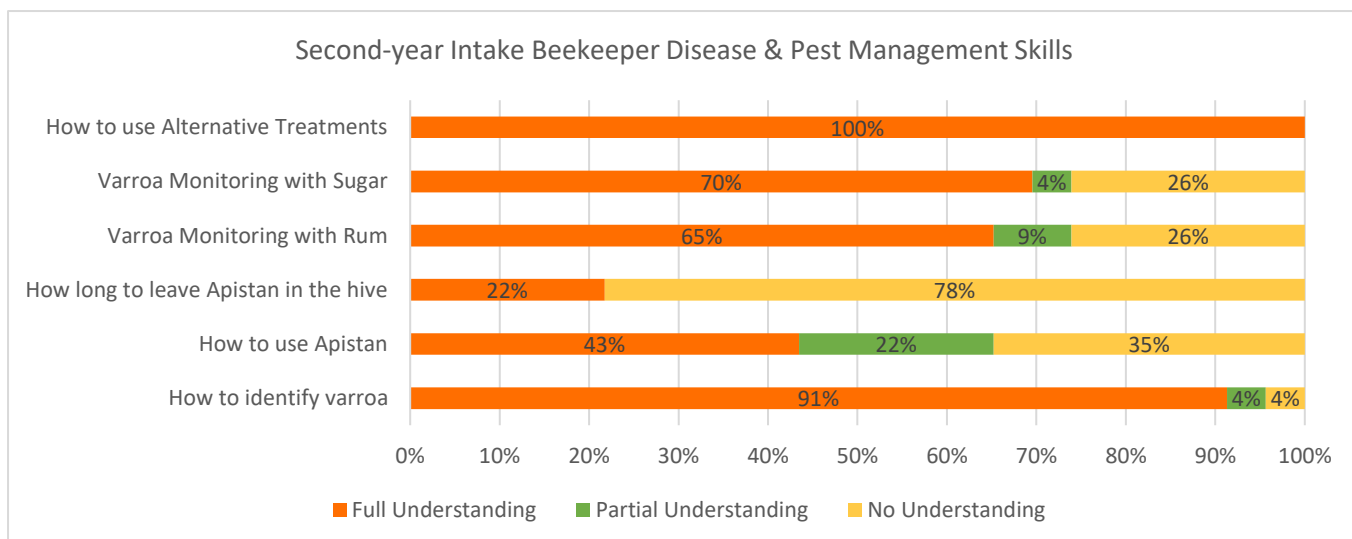
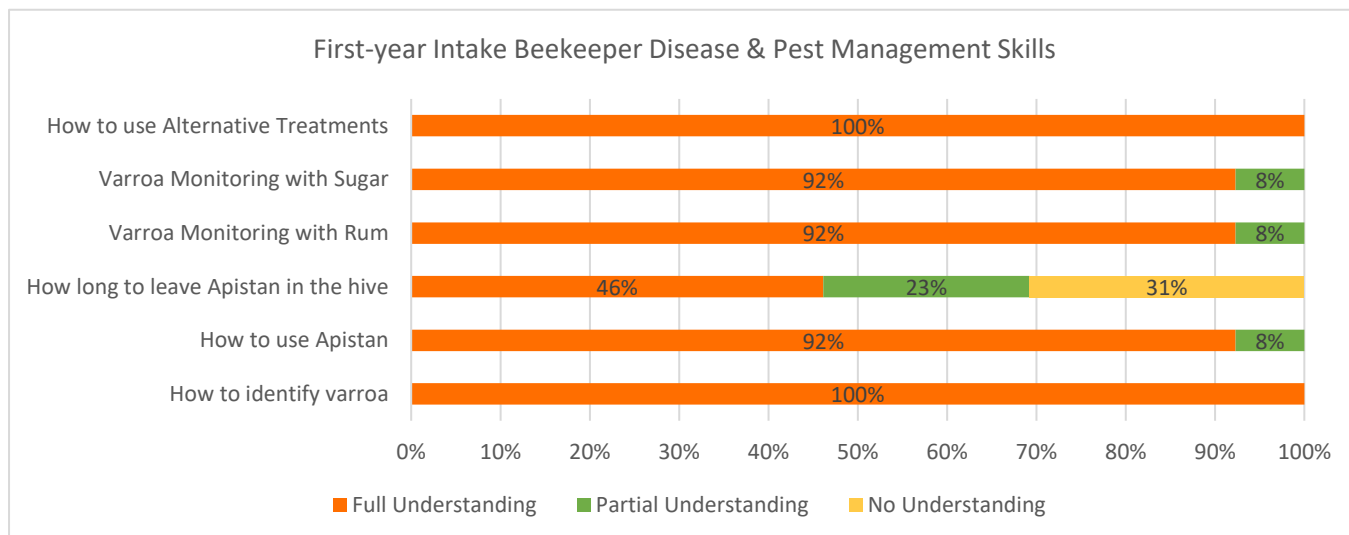
Perosy standing outside his newly-opened shop

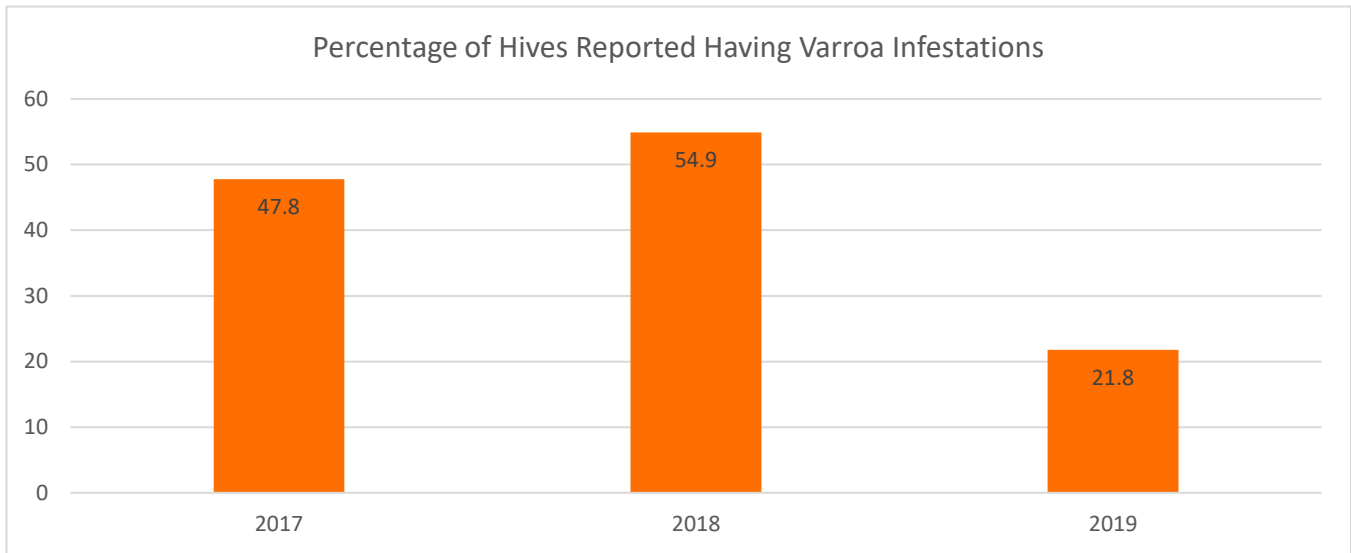
2.4.6 Disease and pest management

The endline survey investigated beekeepers' skills regarding varroa identification, monitoring and management. First-year intake beekeepers recorded solid understanding across most skill areas except how long to leave Apistan in the hive. This is likely due to a history of conflicting advice being given out by NGOs in the past, the effects of which have been challenging to overcome.

Levels of understanding amongst second- and third-year intakes are broadly similar, with both showing poor understanding of how and for how long to use Apistan. However, this group have had far less experience using the chemical treatment than their first-year counterparts. Towards the end of the project, the Renitantly team has also taken steps to reduce the use of Apistan in favour of an approach that emphasises the importance of identification and monitoring and using alternative treatment methods to tackle varroa.

For these reasons it is encouraging to see that understanding of how to identify varroa and use alternative treatment methods like *adagasy* (local herbal remedy) and drone (male) comb removal is high amongst all beekeepers and that monitoring methods using sugar are also largely well understood, though to a lesser extent. Further encouraging signs in the fight against varroa could be seen in the fact that only 22% of hives were reported to be infested with the mite when the endline survey was conducted. This is compared to 48% and 55% at the 2017 and 2018 annual surveys respectively.





2.5 Dissemination of Results

2.5.1 Community dissemination

While visiting each community during the endline survey, the project team took the opportunity to disseminate key findings from the project to beneficiaries and the wider communities and local government representatives. The Project Coordinator delivered a presentation outlining key results and an infographic was shared, which presented these results in an accessible manner.

The community dissemination events acted as an open forum for beneficiaries and community members to speak frankly about the challenges faced during the project as well as celebrating their successes. Community members also expressed interest in a potential second phase of Project Renitantly, with many non-participants eager to join the project.

2.5.2 Apimondia conference

In September 2019, SEED's International Beekeeping Specialist attended the Apimondia World Beekeeping Conference in Montreal and presented an overview of Project Renitantly and its achievements.



Project Coordinator Juve disseminates results to community leaders (left) and International Beekeeping Specialist, Darcy Gray, presents a poster at the Apimondia Conference (right)

3 Looking Forward

Throughout Renitantly Phase 1, a number of challenges were identified as being in need of addressing by any potential second phase of the project. As well as expanding the scope of the project to three new communities, Phase II will address key themes including:

3.1 Two-Tiered Training Approach

Currently, SEED takes a 'one size fits all' approach to delivering training workshops. However, in Phase II the curriculum will be stratified so that advanced beekeepers who are seeking to make beekeeping their primary livelihood are able to receive more technical and in-depth training, whilst beekeepers with more modest ambitions are still able to increase their supplemental incomes earned through beekeeping.

3.2 Creating a Beekeeping Cooperative

Currently, beekeepers are operating individually with low levels of collaboration. Creating a cooperative will enable pooling of resources, particularly when transporting honey to lucrative distant markets, which will increase supplier power and lead to higher prices and more secure sales.

3.3 Implementing a Robust Pest Management Strategy

Despite the significant progress made during Phase I, varroa continues to pose a significant threat to the livelihoods of beekeepers in Anosy. The second phase will utilise the partnerships developed with leading international researchers to design and implement a robust and effective pest management strategy which can be piloted in Anosy and then shared with stakeholders across Madagascar to begin tackling varroa nationwide.

3.4 Increasing Available Bee Forage

In addition to varroa, the health of honeybees is being threatened by high levels of deforestation which is reducing the availability of forage, honeybees' source of food. Phase II will implement an education campaign to encourage community members to protect bee forage by highlighting the important role bees play in local ecosystems, especially as pollinators for subsistence farmers. The campaign will be held in conjunction with planting events which directly supplement the availability of forage in areas surrounding target communities.

4 Conclusion

Overall, Project Renitantly has delivered on its key objective of developing beekeeping as a sustainable livelihood for 78 beekeepers across six rural communities in the Anosy region. High levels of understanding of key beekeeping skills have resulted in significant increases in hive numbers and honey yields. This, combined with increased sale prices due to expanded routes to market, has enabled beekeepers to significantly diversify their livelihoods through beekeeping. While varroa has posed a significant threat to the sustainability of beekeeping as a livelihood throughout the project, recent results have indicated that the project's strategy to mitigate the impacts of the pest have begun to bear fruit, further strengthening the sustainability of beekeeping as a livelihood for rural communities in Anosy.

References

ⁱ World Bank (2018). *Poverty and Shared Prosperity 2018: Piecing Together the Poverty Puzzle*. Washington, DC: World Bank. License: Creative Commons Attribution CC BY 3.0 IGO

ⁱⁱ World Bank (2017). *The deep South: Constraints and opportunities for the population of southern Madagascar towards a sustainable policy of effective responses to recurring droughts/emergencies*. [online] Available at: <http://documents.worldbank.org/curated/en/587761530803052116/The-Deep-South>. [Accessed July 2019]

ⁱⁱⁱ World Population Prospects. (2017 Revision) United Nations population estimates and projections.