

Agroecology case study #2: Building agroecological understanding for effective pest management with coffee farmers

This case study is based on an interview in 2013 with agroecologist and agronomist Germán Rivero, formerly of Fundación Natura in Colombia. It was conducted by PAN UK as part of the project *Growing Coffee without Endosulfan* (see the project videos and guidance materials¹). Germán and other Fundación Natura colleagues expertly organised field visits to meet farmers and managers of small, medium and large farms. In this interview, Germán explains how he works with farmers to help them understand agroecological principles and put them into practice in their coffee farms, with a focus on managing the Coffee Berry Borer pest with minimum or zero recourse to pesticides.

PAN UK: *Please tell us about your work in training farmers on pesticide reduction and Integrated Pest Management.*

Germán Rivero (GR): Fundación Natura has been working for over ten years to implement Rainforest Alliance certification in Colombia, promoting sustainable farming methods, especially in coffee, with very good results. The process started in close collaboration with the National Coffee Growers' Federation (FNC) and it's very important, with around 50,000 hectares now certified. We use the opportunity of farmers motivated to gain certification to help them learn the rationale behind suitable sustainable practices and create awareness of these issues, including correct use of certain agrochemicals. It's obvious that at certain times a farmer may need to use pesticides if a pest is getting out of control and it will reduce the farmer's income but it's very important that they first identify which pesticide products they're not permitted to use [under the Rainforest Alliance SAN standard]. So there's a list of prohibited pesticides and those which aren't permitted in some [export] markets- this helps farmers to appreciate that if they're prohibited in some places, there's a good reason why and it creates awareness and motivates them not to use certain products which are extremely hazardous- endosulfan is one of the obvious ones. So they're willing to stop using certain products in their farming system. Logically, our accompaniment on farming practices looks at more suitable methods of managing the Coffee Berry Borer pest [*Hypothenemus hampeii*, a beetle which causes serious damage to coffee bean quality and price], without pesticides. Using this set of IPM methods, it's been relatively easy for farmers to eliminate endosulfan.

PAN UK: *Can you tell us a bit more about how you help farmers manage the Coffee Berry Borer beetle without insecticides?*

GR: As part of sustainable practices, it's essential that farmers understand that pests and diseases should be managed in an integrated way and that there's no magic formula that's going to control the insect. The other important thing is to realise that we're not trying to eliminate the insect or pest but to get an adequate control so that farmers' income won't be affected. Within this vision, Coffee Berry Borer IPM is a set of complementary practices, one is not necessarily better than another, so we get a universe of practices which we can use according to the farm context and zone. In some areas, IPM is more complicated due to the climate, flowering pattern and some methods will need to be done rigorously, while in other areas, things are more flexible because the ecosystem has been preserved or rehabilitated,

with lots of insects, such as wasps, or communities of fungi, which in different ways can contribute to controlling the pest. So IPM is a set of different practices but which need to be constantly monitored, checking regularly what level of pest you've got in the crop and identifying in which zones you've got higher pest incidence, what level. Then on top of this monitoring, each farmer should know what his or her 'menu' of practices comprises and how s/he can implement them according to their particular circumstances.

Our way of working is to focus on why we do things in a certain way, as much as the methods themselves. If we manage to get the coffee farmers to understand the reasoning, the logic behind the method, it's much easier for them to implement and use them. So we work through workshops, discussions, demonstrations, illustrating first of all the importance of conserving biodiversity, which is fundamental to help get a balanced ecosystem and control pests at tolerable levels for production, plus how to implement controls at the right time, e.g. putting up traps to capture and monitor the pest. Then there's the importance of regular harvesting and picking berries – as there are always green berries developing on the trees, this means picking them as soon as they're ripe. Plus methods at the pulping station e.g. plastic covers and mesh or filters in the drains to trap beetles, otherwise they can escape from the processing station back into the groves.

Enhancing functional biodiversity in coffee groves for pest management: So there are a lot of different tactics but most important is to explain the 'why' of each practice and to try and strengthen the ecosystem so that it will actually help the farmer's task in keeping the pest at minimal levels. These are topics which not everybody tries to get across [to farmers] and it's perhaps what makes our work a bit different, trying to get an alliance between the farmer and the ecosystem. **The farmer commits to preserving biodiversity and keeping the ecosystem healthy and the ecosystem responds by providing space and balance so that pests don't end up doing a lot of damage [good to use this sentence as a side bar quote].**

And of course these processes take time. For example, the experience some years ago in Colombia of producing and disseminating *Beauveria* fungus, [a naturally occurring fungal disease of insects, strains of which can be formulated as biopesticide products to target specific pests] which was done with a lot of effort and we've found that there are now populations of this fungus in many farms. The same with the wasp releases many years ago [parasitic wasps, used as biocontrol agents for Coffee Berry Borer], which had some problems when they weren't handled properly, but eventually we've been able to find them in some zones, but that has taken years. It's rather complicated because many farmers want immediate results - like all of us, they want to solve a problem straight away, with a single method that will sort it all out. But these systems of fostering functional biodiversity to enable farmers to improve their production systems take time. And this means we need to stick with them and ensure that the farmer doesn't fail to a certain extent because they are too focussed on getting quick results.

PAN UK: *So do Beauveria applications not necessarily control the beetle today but help increase background levels of this beneficial fungus as a biological control?*

GR: That's right and that's the thing about these biological processes, they're not 'shock tactics'. In other words, farmers need a bit of patience to see and get results. All these biological aspects and biodiversity interactions in pest control aren't immediate and you need

a certain level of patience before you start seeing results. But it's without doubt that when farmers follow sustainable practices the results will be economically favourable for them.

PAN UK: *Is Beauveria biopesticide use economically comparable with chemical use?*

GR: Well, we've not done that comparison and you can't really compare such different situations. When I apply a chemical I get an immediate result and this can be with a low expenditure but with biological products and strengthening biodiversity there are lots of variables you can't quantify so that makes doing an economic comparison very hard. Besides, there'll be many biological interactions we can't even identify, much less quantify or try to put a price on, so in my opinion it's complicated to try and do that analysis in US\$ dollar terms.

PAN UK: *Regarding fungicides used to control coffee rust disease, could these negatively affect Beauveria fungus, especially if the farmer only has one sprayer?*

GR: Yes, exactly. And it's a bit contradictory, trying to encourage one fungus to attack the pest and at the same time using a fungicide to control a different fungus which is affecting the yield. But that's where I return to the efforts of the Colombian coffee sector and the strength of the FNC and [its research institute] Cenicafe's efforts with disease resistant coffee varieties. Cenicafe's effort with the [fairly new] *Castillo* variety has been fantastic. The plant is resistant to rust disease and it also has very high productivity, with a large bean size and a good taste, so it's succeeded in all the factors which farmers didn't like about the [earlier] *Colombia* variety. And this takes a lot of other problems off our shoulders so the problems about fungicide spraying to some extent disappear if you've got a disease-resistant variety, plus it's a variety which adapts well to agroforestry systems. In other words, I don't have to grow it in full sun or get rid of my shade trees. I want to stress that it's been developed by cross-breeding many lines so it's got good genetic diversity and this should help it maintain its rust resistance and so we can hopefully have sustainable resistance for a long time.

PAN UK: *Cultural controls are the backbone for Coffee Berry IPM but they take time and money – do you think all Rainforest Alliance certified farmers are taking maximum advantage of them?*

GR: As you say, it's the principle component of good control. This is a really important part of our training, so farmers realise what will happen if they don't pay it adequate attention and let pest levels rise. What we call 'ReRe'- continuous harvesting and picking off the remaining berries – is the only Coffee Berry Borer control method that actually generates income for the farmer. So if he or she is doing good regular picking every 15 days, yes it does cost labour but if you leave those berries unpicked, you're just running up future problems, higher borer damage and a lower price for your coffee. And with 'ReRe' you're getting some payment back for your effort- which you don't when you spray a chemical. When you spray you have to dig into your pocket and pay for the product, the workers, protective clothing kit, your spray equipment and you don't get any cash back on those. But you do with 'ReRe' because you can sell those beans and get some income. But if you don't do it in time and you let the pest build up, it's not sustainable, your beans will be very damaged and won't be suitable for sale, the problem will spiral out of control. So it's really important to get across that doing 'ReRe' has to be punctual, properly done, plus the farmer needs to be constantly

monitoring to make sure borer levels aren't increasing to the point that these control methods no longer work.

PAN UK: *So how realistic is it for farmers to sample and estimate Coffee Berry Borer incidence?*

GR: Well, in fact, when a farmer decides to start sustainable practices for a certified standard such as Rainforest, part of those practices is precisely that of monitoring the condition of the grove. So many of the farmers do sample but it's important they do it because they're convinced about it and it will help them make well-founded decisions. But there will be some who don't sample. You need to take into account that in Colombia the average age of coffee farmers is pretty old and for some of them doing this kind of sampling or calculating percentages is not easy. However, many will get their kids or grandkids to help them. But it's very much a requirement of Rainforest that farmers do monitor their fields and understand why they need to do this – it's not just doing it because that's what the standard requires but because they really understand the concept and how monitoring helps with proper management of this pest.

PAN UK: *What about pesticide use in your work with farmers?*

GR: Rainforest Alliances emphasises IPM as a basic requirement, with monitoring of pest levels and implementing cultural and other control methods. Part of this permanent monitoring is to enable the farmers to identify the times and sites where cultural and biological controls aren't sufficient and they may need to use a chemical but only in hotspots where they've identified a problem and, of course, only using products permitted by Rainforest, because many insecticides are not allowed. We have a long list of prohibited substances and it's the molecules [i.e. active ingredients], not the trade names, because as a global standard Rainforest can't put all the possible product names. If pesticides have to be used, it's with maximum protective gear, they need to use gloves, face shield, boots, a waterproof overall. True, it's difficult to wear in hot conditions but it's possible and creativity has been interesting.

PAN UK: *Do you have any concluding comments from your experience?*

GR: It's thanks to 80 years of research support for coffee from Cenicafé [the research institute of the National Coffee Growers' Federation], in which they've been developing Coffee Berry Borer IPM for years, that smallholders can achieve effective control, reducing economic damage from the pest, without the control methods being toxic for farmers. With this support it's been relatively easy for Fundación Natura to help Colombian farmers manage the borer, which some years ago was causing very serious problems. I think most coffee farmers, especially smallholders, have adopted IPM methods and recommended practices so we've found it relatively easy to eliminate endosulfan.

We do try to value successful experiences, not just in Coffee Berry Borer management, but all aspects of implementing sustainable practices. We find that farmers have a huge capacity to come up with strategies and practical, feasible, economical methods, so we can learn a lot from them, bringing together farmers' wisdom and contributions from others and together we can design practices useful for almost all contexts. It's really important this process of making use of farmers' knowledge and experience and compiling good practices to improve the sustainability of production systems.

A case study of agroecological coffee production developed by Don Juan Guillermo Londoño on his medium sized farm in Colombia's Risaralda Dept. features in PAN International's book on phasing out Highly Hazardous Pesticides with agroecology².

Germán Rivero is now Director of Colombian NGO *Nueva Ruralidad*, which aims to build more sustainable livelihoods for a new era of rural life in Latin America. Email: german.riveros@nuevaruralidad.org.co. Website: <http://www.nuevaruralidad.org.co> [in Spanish]

Notes

1. The set of videos of farmer experiences in managing Coffee Berry Borer using non-chemical methods, plus other project material and IPM guidance, can be found via: <http://www.pan-uk.org/coffee-without-endosulfan/>
2. Case study 8.2 in *Replacing Chemicals with Biology: Phasing out highly hazardous pesticides with agroecology*. PAN International, 2015, pp.136-141. Via: <http://www.pan-uk.org/agroecology/>