

Harnessing the power of diversity

Prior to COVID-19 constraints, the Lighthouse Farms team travelled south in search of the secret ingredient that is common to all Lighthouse Farms – diversity, writes Rogier Schulte

The entire village of Kepanjen came out to welcome Annemiek, co-ordinator of our Global Network of Lighthouse Farms. Annemiek is on a quest to find the secret to the success behind our Indonesian Lighthouse Farming system: ‘Complex Rice Systems’. On the back of a motorbike, she is brought into the rice paddies of East Java. Here, Dr Uma Khumairoh explains how communities have learnt to harness the power of diversity.

“First, farmers add Azolla to the paddies – an aquatic plant that fixes nitrogen from the air, just like clover in grassland.

“Then, they add ducks that gorge on the pests of the rice crop. Fish are grown in hatcheries and added to the fields to perform the same function below water. Together, these animals also provide additional sources of protein and cash. Finally, crops grown between the paddies diversify the diet and give shelter to the natural enemies of the pests.”



Dr Annemiek Pas Schrijver (left), co-ordinator of the Global Network of Lighthouse Farms, learns about the workings of the Complex Rice Systems from Dr Uma Khumairoh of Brawijaya University.

The best of all worlds

For years, Dr Uma has painstakingly measured the effectiveness of all these components, and their combinations. Her team at Brawijaya University has measured crop yields, weed infestations, nitrogen balances, observed duck foraging, even studied the content of their stomachs in the finest detail. Her treasure trove of data, pub-

lished in high-ranking scientific journals, shows that when the right components are put together, Complex Rice Systems provide more income and better diets for the community. And, equally important, they are more reliable and resilient in the face of climate shocks, such as the droughts and floods, that are increasingly common in that part of the world.

Harnessing diversity

These experiences remind us of the similar patterns we saw at Lighthouse Farms in other continents, other climates, other soils. This spring, we saw how crops grown in strips in the Netherlands benefited from each other's proximity. In Finland and Latvia, we learnt that clever combinations of crops, animals, green manures, bioenergy plants and fish can give us the best of all worlds – more food, more energy, more income. Soon, we will travel to our Irish Lighthouse Farm and explore how we can find similar principles on grassland farms.

Does that mean all farmers will benefit from any combination of crops, animals, or farm components? Of course not. In many cases, crops or animals will simply compete with each other. However, together with our Lighthouse Farms we are searching for combinations proven to work well together. Carefully designed combinations, where each crop or animal has a clear role, and is used at the right place and at the right time.

So, is there a catch? Yes, there always is. Managing diversity demands a lot of expertise and labour, more than we can expect from any one person. As we return from our travels, Annemiek and I agree that “it takes a village to manage complex farming systems”.

In our next article, we will explore the diversity of solutions that our Lighthouse Farmers have found to overcome this challenge, each in their own way.

Organising farming to mimic the Atlantic Rainforest in Brazil

Are these complex systems unique to Indonesia? Can we find similar patterns on other continents?

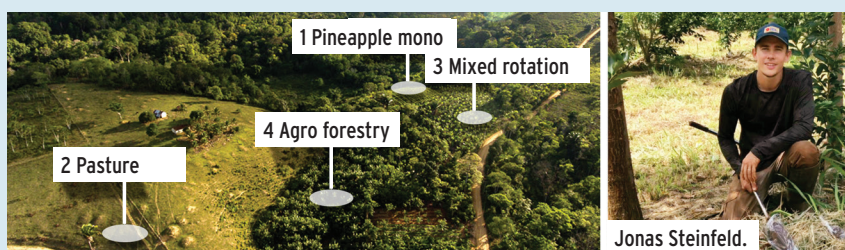
At the same time that Annemiek visited Java, Lillian O’Sullivan (Teagasc) and I travel to the state of Sao Paulo in Brazil.

Here, we are hosted by Jonas Steinfeld, of Swedish-German descent, and his wife Erica, of Japanese-Brazilian descent. Jonas is studying farms along their “gradient of complexity”, from monocultures to complex agro-forestry farms.

Jonas explains his research as we drive to Rizoma Agro, our Brazilian Lighthouse Farm. The farm is huge and hosts large maize fields, some pastures, and fragments of the original Atlantic rainforest.

As we pass one of the patches of forest, I notice that the trees are placed in rows. Not only that, but every second tree is a lime fruit tree, mixed with eucalyptus, mahogany and native Guapuruvu trees.

Jonas explains: “The Atlantic rain-



forest used to be one of the world’s hotspots for biodiversity. Now, more than 85% of it has been lost to urbanisation, industrial agriculture and land degradation.

“Here at Rizoma Agro they are trying to rebuild the structure of the original rainforest, but this time using food and timber crops instead of natural trees.

“They carefully select the trees to resemble the four canopy layers that we can find in the rainforest. They frequently prune and mulch these rows of trees to mimic the rapid cycling of biomass.”

The approach is bearing fruit – quite

literally. Jonas has demonstrated that these agro-forestry systems provide a better income, store more carbon, and cycle nutrients much better than the neighbouring monocultures.

Now, he is searching for the best combinations of crops.

“Some farmers are very happy to work with 30 different tree species – they literally live in their own home-grown food forests. But many farmers prefer to keep their farm more straightforward, while still reaping the benefits of diversity.

“I am trying to find the best number of crops for each of these farmers,” Jonas commented.

Comment

While portrayed as complex, the diversity examples reported here are somewhat reminiscent of Ireland’s very mixed farming systems of a few generations ago. But does having on-farm diversity mean having to go back to the past? The simple answer is “no” because people will not go back to that level of change.

In his next article, Rogier will explain how we can manage more complex farm systems, even with much larger farm scale. This is now possible because we have a much greater knowledge and understanding of how systems interact. We also have many important technology tools to help us manage and optimise these systems.

Rogier’s next lighthouse article will include an Irish farm and be based around managing complex farms.

Our ability to understand the strengths and weaknesses of individual systems is important to help mould systems together for the betterment of farm profitability.