

## Will Zanzibar's algae farmers soon be ruined?

Carrageens are contained in soft drinks, shampoos and ready meals. These carbohydrates, which are also known as E407, are gained from red algae, also in the shallow water along the coast of Zanzibar, where they constitute an important – and sometimes the only – source of income for women. However, trading this much-demanded natural resource is threatened.

By Klaus Sieg

Turquoise water and white sand as far as the eye can see. Paje Beach, in Zanzibar's Southeast, is a dream destination for all tourists. If they don't happen to be lazing by the pool of their resort or hanging out in one of the countless bars, they can be seen sitting or lying on the beach, usually holding a drink or an ice-cream. In the evening, they will help themselves at the buffet and, just like nearly everyone else throughout the world, brush their teeth. Some of them then also apply a lotion to their skin, which has had to bear the equator sunshine. Only few of them will probably be aware that in consuming all these products, they have nearly always come into contact with an ingredient which is gained from the shallow water along the beach, right in front of their noses.

Mwanaisha Makame peers across the beach with squinted eyes. The brilliant sun, the white sand and the salty air – it all puts a strain on the eyes. "But we have to keep looking after our algae," 45-year-old Makame says, tightening her colourful scarf, pulling up her long skirt a little and then wading into the lukewarm water together with two other algae farmers. Their goal is behind the gentle surf rolling towards the beach. There, the water of the Indian Ocean, which is still shallow and very warm, laps around wooden poles stuck into the sand in rows. The women bend down, pull out weeds, fasten some algae anew and remove individual impurities. They also harvest some of the algae. Finally, they carry a couple of yellow-green bundles to the beach. Pointing at one of these bundles, in which the

slithery stems full of little branches which look like rubber worms intermingle, Makame says: "This is what the miracle plant which they use all over the world actually looks like."

### A substance for all needs ...

Not very appetising – but that's not an issue as far as the final product, carrageen, which is gained from these fast-growing aquatic plants, is concerned. And this is why everyone talks about it. As E407 binds and thickens glaze, yoghurt and other dairy products, pastries, soft drinks, diets for sportspeople, sausages, chocolate bars, ketchup, custard or ready meals. E407 is one of the few additives also permitted in organic food. Above all the



Mwanaisha Makame (right) is the chief earner in her family.

Photos: Jörg Böhling



Hardly any women in Zanzibar can swim. Women have to rely on men's support in sailing boats and diving for algae.



Dr Flower Msuya is the chairperson of the Zanzibar Seaweed Cluster Initiative.

burgeoning group of vegetarians and vegans eat it frequently. Agar Agar, used as a gelatine substitute in jelly babies, sandwich spreads, soy milk or tofu cold cuts, and also obtained from algae, is likewise popular among them. What is more, carrageen is used in many cosmetics and body care products, in the dye and paint industry or as an additive in drugs. "Demand has been growing for years, and new fields of application are still being created," says a spokeswoman for Cargill, one of the world's biggest carrageen manufacturers. Food developers in particular would hardly find an alternative substance with such excellent properties. Despite its health impact recently having become somewhat controversial, the popularity of E407 is still on the rise.

### A bit of financial independence

This is good for Makame, who has been growing algae for more than 25 years. "Success was initially modest, and now I am the chief earner in my family," she explains. Although her husband works as a diving instructor, his income is irregular. She can harvest the algae eight to ten times a year, and she can plant them just as often. For this purpose, Makame ties little saplings to ropes, which are then fastened to poles in the water. Nature sees to the rest virtually on its own. After two or three months, the algae are ready for harvesting, they have formed the crucial ingredients, and their biomass has grown twentyfold. So the plants aren't much work.

This was also what Tanzania had in mind when it introduced the two red algae varieties *Eucheuma spinosum* and *Eucheuma cottonii*, originally from the Philippines, in the semi-autonomous archipelago off its coast in the 1980s. Both species are especially suitable

for the production of carrageen, although they do need tropical water temperatures. Women in particular were intended to earn income growing them alongside seeing to the household and the family, thus gaining independence in a traditionally shaped culture. This appears to have been a success, albeit at a modest level. Makame earns the equivalent of roughly 40 euros a month. That is almost half the wage of a labourer in the city. And with it, you can buy a lot in Zanzibar, as long as you're shopping outside the tourist hotspots. And then there is Makame's proud smile. Otherwise, she and the other women would find hardly any employment on the island of spices.

"Most of the algae farmers used to depend on government support, which they no longer need," says Flower Msuya, an expert on algae at the University of Dar-es-Salaam, whose marine research institute is located right at the ferry terminal in Stonetown, the old city of Zanzibar's capital. There are piles of papers and files on the little table and the warped shelf in her office. An old-fashioned PC screen is flickering in the dark room without any windows. This senior researcher is about to leave for a conference in Dar, as the capital on the coast of the mainland opposite is known. Her expertise is in high demand, and she was involved in the introduction of the algae right from the start. One of her activities has been the setting up of the Zanzibar Seaweed Cluster Initiative (ZaSCI), a network that is meant to bring together farmers, traders and producers. "After the Philippines and Indonesia, Tanzania is the third largest area the plant is grown in world-wide," she explains, referring proudly to what has been achieved so far. "With its 24,000 women farmers, the algae business now employs the largest number of people in our archipelago," Msuya notes.

### Climate change is threatening the trade

However, the red algae business has run into difficulties. Climate change is to blame. Over the last 30 years, the Indian Ocean's temperature has risen by one degree – with disastrous consequences for the shallow water off the coast. "In the 1990s, it was never warmer than 31 degrees, but now it can heat up to 38 degrees." This is making the red algae vulnerable to disease. The women are losing parts of their harvest, which is why Msuya and her colleagues are attempting to establish cultivation in deep water, where temperatures are lower.

The coast in front of the village of Muungoni, in the Southeast, has no white, sandy beach – and hence no tourists. Instead, there are plenty of jagged rocks and coral reefs. The rubber gloves of Jina Makame and the other members of the group are correspondingly tattered. The women have just gathered algae to reproduce them. For this purpose, they tear the plants into finger-long ends that are tied to ropes, and then they are pulled through blue pipes into longish nets that are subsequently anchored a couple of metres deep out in the sea. "This keeps the current from drawing the saplings away," Jina Makame explains. This vegetative reproduction of red algae enables unlimited further cultivation. The farmers are still working with the offspring from the red algae imported in the 1980s.

Once all the nets are full, Rajid Mohammed starts the boat's outboard motor. The women, all of them wearing lifejackets on top of their colourful clothes, carefully step onto the boat, which is swaying to and fro. "We can't swim," Jina Makame grins timidly. Hardly any women in Zanzibar can swim, even though they live right next to the sea. Here, it is simply not cus-



tom for girls and women to swim. This is why Mohammed and his two helpers have to deal with swimming and diving, which, alongside the costs of the boat and fuel, is a further hindrance to deep water algae growing, at least if mainly women are to continue benefiting from the business. Algae cultivation in deep water would enable double the present yield. And the demand is there. “If we give him a call, the buyer will come on the same day, for he is very anxious about us selling the harvest to someone else,” Makame later on explains in front of her house in the village and, grinning, strokes her arms painted with henna-coloured ornaments. The 37-year-old woman is sitting next to sacks full of red algae that sea salt is trickling from. Next to them, the harvest just brought in is drying on the ground, with the individual plants turning more and more colourful. “Unfortunately, they only buy them dried,” says the mother of six. She is paid the equivalent of 40 euro cents for one kilogram. On average, this earns her 30 to 40 euros a month, which one kilogram of carrageen costs a multiple of in the industrialised countries. According to Makame, the price is better than it used to be thanks to the engagement of the Seaweed Cluster Initiative, although she notes that it is “still too low”.

### Value is added elsewhere

With Cargill, CP Kelco and a further US corporation, three major carrageen manufacturers are represented in Zanzibar that produce and distribute the substance world-wide. The buyers travelling around the villages supply the subsidiaries of these major corporations, which have their own warehouses at the docks where the algae are further dried, cleaned, pressed and packaged. The miracle material is produced in Europe, the USA, the Philippines and China. “We export almost 15,000 tonnes of dried algae to these countries,” notes Haji Abdul Hammid as he peers from his office window across the port of Zanzibar, where the quay’s only crane is just loading a ship with containers bearing the names of the well-known international shipping companies. Hammid heads a Trade and Industry Ministry agency promoting small and medium-sized enterprises. “We really have to make better use of this potential, and this means that Zanzibar needs carrageen production of its own,” he stresses.

In order to extract the carrageen, the red algae are washed and boiled in an alkaline solution for up to 48 hours. The solution is sub-



Jina Makame is paid the equivalent of 40 euro cents for one kilogram of red algae.

sequently filtered. Only then is the carrageen precipitated with alcohol or gelatinised with potassium chloride. Once it is dried, the substance thus obtained can then be ground into the state usually traded and packaged. “Not a particularly difficult process, but we need technical support and above all investors seeking to put their money elsewhere than into tourism,” says Hammid. He has developed a business plan for a carrageen factory. Also, he will soon be meeting experts from Indonesia to explore options for how such a plant could meet the required quality standards. “In the Philippines, the Chinese are currently establishing carrageen production – but we don’t necessarily want to invite them here,” Hammid remarks.

### Too many obstacles to local production

For some time, reports have been circulating in the media that the production of carrageen and Agar Agar is soon to commence in Zanzibar. Tanzania’s Ministry of Agriculture recently launched such a plan in collaboration with a major seafood producer based in Dar-es-Salaam. At local level, however, such reports vanish into thin air. Responding to queries about the challenges involved in manufacturing carrageen, the corporation states that in addition to the constant supply of red algae of the right quality, this also requires detailed know-how regarding the various requirements for the wide range of applications. Actors at national level also tend to be more sceptical about manufacturing the miracle substance in Zanzibar.

“Establishing carrageen production may be a good idea, but I am not sure whether this can work here,” says one of the leading buyers of red algae in Zanzibar, a local who doesn’t want to have his name mentioned.

He says that the tax burden in the archipelago is too high and port handling of cargo is chaotic. “Sometimes, our containers are stuck for weeks or even months,” he notes, adding that the corporations then have to buy the respective capacities elsewhere. “And yet the quality of the red algae here meets the standards, and everything that is harvested is bought up by the companies,” the buyer remarks.

Nevertheless, the producers cannot always supply. Water that is too warm causes diseases among the plants, while storms and other weather events lead to interruptions in supplies as well. And if the algae are not sufficiently covered by seawater, rain or dryness can threaten the harvest. Cargill confirms these challenges and difficulties too. This corporation, which buys red algae on four different continents, has therefore launched the Red Seaweed Promise initiative. According to Cargill, world-wide, around a million producers and their families and communities depend on red algae sales. The initiative is meant to offer them more support in growing, harvesting and marketing the product.

Mwanaisha Makame and her group of women algae farmers from Paje have started their own production with the aid of the United Nations Food and Agriculture Organization. They manufacture soap, oils, pasta or fried snacks with their algae. Red algae contain many minerals and vitamins as well as anti-oxidants. “During the season, we sell quite a lot to the tourists,” she says, greeting a tourist approaching her on the beach. However, the women only process a very small portion of their harvest for their own production. They continue to sell most of it in dried form to the buyers. They have only limited influence on whether this will stay a source of income for their families. If global warming is not stopped, all that can help them will be new varieties of red algae that can cope with the rising water temperatures. Otherwise, only the tourists will be left on the beaches of Paje.

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