Kia ora, gday and welcome to the History of Aotearoa New Zealand. Episode 47: Colder, colder… This podcast is supported by our amazing Patrons. If you want to support HANZ go to patreon.com/historyaotearoa. Last time, we had the story of Mataora and Niwareka and how they brought the arts of tā moko and tāniko to the world. Before that we had a series of interviews on modern Māori music and reaptriation and before that we were talking about taonga pūoro, Māori musical instruments. This episode, it's the start of a new topic! Initially this was meant to be a probably 5 to 6 episode series on pre-European Māori food, including hunting, fishing, cooking and everything in between. However, I ended up finding more infomation on horticulture alone than our biggest topic so far, tā moko. So the next probably 5 or so episodes are going to be dedicated solely to Māori horticulture and foraging and then we will move on to other aspects of food, after that. We covered food quite a bit in our early episodes, particularly in regards to the moa hunter era of Māori cuisine. We aren't going to revisit that aspect specfically but we do need to retread a little ground and talk about the plants that Māori brought to Aotearoa from East Polynesia and the struggles they faced once here.

Back when Māori where sailing to Aotearoa from East Polynesia, around the mid 13th century or so, they weren't just bringing themselves to a new land. As the story goes, Kupe would have told them kind of what to expect when they arrived but that doesn't mean they really knew what they were walking into or what dangers they might face in the longer term. So to make sure they weren't going to immediately starve in this strange land, they brought a whole bunch of edible plants with them. All of these would have been tropical plants like breadfruit, sugar cane, banana and coconut. These would have been plants intended to be used as seeds and naturally as soon as various groups found their new permanent homes, one of the first things they probaly did was plant all their seeds to start growing some food. The problem was that this was based on a now obsolete knowledge of horticulture. I don't mean obsolete in the sense that their old way of growing was worse than what was needed in New Zealand but that the conditions, especially the climate, required a new way of thinking. A way that of course wouldn't be readily apparent when you only turned up 5 minutes ago. What I'm talking about is a tropical way of thinking about horticulture. East Polynesians arriving in Aotearoa at this time would have been used to the climate being good for growing more or less all year round so the natural assumption would have been that this was the case here as well. Even if the weather was bucketing down that day, it would clear up the next. In some cases this was true, as you will hear going forward, the Bay of Islands and the Nelson/Golden Bay area are huge exceptions to the rules we will be discussing. By and large though, the climate in most areas of the country was much colder and rainier than the Polynesia they were used to. As such, all the plants I mentioned before would have died, evidenced by the fact that they are never mentioned by Māori as a post-migration foodstuff and that Europeans never saw them upon their arrival either. How long it took for this die off to happen depends a lot on when East Polynesians arrived in Aotearoa. If they arrived in winter, the plants would have likely died within the first few weeks, whereas if they landed in summer, they may have lasted for a bit longer. Until winter rolled around and then they died.

Although this was a pretty big hit for the first instances of any sort of horticulture here it clearly wasn't a general threat to the population as a whole. Other ways of gathering food in the tropics could be applied here with minimal modification and still work well. It was primarily Tangaroa, god of the sea, that was likely keeping the early human population fed with fishing, shellfish gathering and hunting marine mammals, as well as fowling on land. This was also eased as Māori began to get an idea of what wild plants they could eat through foraging, such as the roots, hearts and fruits of native trees and the indomitable fern root. Further easing the pressure was that some of these fruits were poisonous which initially would sound like a bad thing but the transferable tropical knowledge would have been there to be able to make them edible.

That isn't to say that horticulture in general was gone for good, it was just reduced, at least initially. Those of you listening closely will have noticed I failed to mention some tropical plants and even one American plant that was brought by Polynesian voyagers. Gourds, taro, yams, paper mulberry and a species of tī, that is cabbage tree, were pretty much the only tropical plant species to survive their translocation. The last plant though, didn't just survive, it thrived, becoming the central core of Māori horticulture that all planting was based around with the Māori calendar. In fact, it was so important that heavy tapu, along with other spiritual and religious significance was placed on its planting and harvesting. As we mentioned in episode 9, it is possible that this plant is solely responsible for Māori culture taking a more martial stance. Well, sort of. If you haven't guessed what it is yet, let me introduce you to the backbone of the Māori horticultural industry for more than 400years. If you are overseas, you might know it as the sweet potato, but here in Aotearoa we call it the kūmara. And you better believe I found an absolute mega shitton of info on it! Kūmara in particular isn't just important for it's nutrients and tastiness though, planting, harvesting and horticulture in general had a large emphasis in Polynesian culture and culture isn't something that you just toss aside on a whim. As various crops were chosen for their ability to grow in this new environment, their increasing rarity may have meant more emphasis was placed on them, emphasis that was previously held by other plants.

We will talk a bit more about this cultural emphasis later but lets go back a bit and talk about how these surviving plants were treated in the old world and how that had to change in the new world. In Polynesia, kūmara and taro were planted and harvest continuously all year round due to that nice, favourable climate. For taro, the top 15-20cm of the stalk would be cut off and replanted within a few days, with kūmara being planted in a similar fashion. This presented a really major problem to early Māori, if they continued this system pretty much the only place in Aotearoa that had the climate to support this was Northland, and maybe the Nelson area but these plants probably wouldn't have made it that far with this system anyway. This was the major challenge for these new tropical plants, the climate. Unlike Polynesia, it was a whole lot colder with temperatures reaching 5C in some areas as well as having a much greater temperature variation across a shorter amount of time. The latter may not seem bad compared to the former, given frost is a major killer of plants that aren't adapted for it, but the same goes for large and quick temp variations, plants that aren't used to experiencing 20C one day and 5C the next tend to struggle. Add on top that it rained a lot more in New Zealand than Polynesia and you have a recipe for root rot, a bit of a problem when the edible parts of kūmara and taro ARE the roots. Given all this, what we see is that the environment selected for tropical plants that grew quickly. Tī pore, one of the introduced species of cabbage tree, took 18 months to grow to maturity in Polynesia and as such it was mostly restricted to areas in Aotearoa that were the most similar to that climate, namely Northland. As opposed to say kūmara, which takes 5 months to grow, or gourds, 6 months, taro, 7 months and yams, 8 months.

To overcome these challenges early Māori developed some really ingenious methods to be able to keep and eat these plants, despite them not being used to this new climate. The use of gardens was kind of the first step towards this evolution of horticulture. These were often communal areas that were divided up for different whānau or indvidual's use with each plot being designated by a boundary of low stone walls or by natural features, like ridges, edges of swamps or rivers. This was presumably cause these features were rather prominant so they didn't really require any exertion, unlike building stone walls. I should say that these stone walls weren't like walls with cement or anything like that, they seem to be just stones stacked upon each other to form walls. Boundaries could also be indicated by ditches that were dug and archeologists for while thought that these were drainage ditches for removing water. Again, root rot in wet soil was a real danger so it made sense. However later analysis indicated that they were more likely just used to indicate boundaries of

various plots in gardens, where stones were less abundant. There is some evidence of drainage ditches for gardens in other areas that likely don't have good drainage, such as four ditches that were 65m long at the bottom a valley. These would keep the water out of the lower gardens and feed it into the nearby Tarawera River thereby keeping the crops safe from disease.

Removing the water from the soil was all well and good but it didn't mean much if you couldn't keep the soil warm. The plants Māori brought with them needed warmer soil and in some areas that wasn't too bad but in others it was near impossible unless something was done. That something was modifying the soils with other material. Namely stuff like gravel, sand, shells or charcoal. This was mostly done for kūmara plots with the idea being to retain heat to raise the temperature to a point where the plants would better survive, as well to provide some fertiliser and make them lighter to provide more drainage. The one exception to this was volcanic regions. Generally we see ash covering those areas that performs the same function, so usually there isn't any need to modify the soil further. One interesting find was actually on Motutapu Island, right next to Waiheke Island in the Hauraki Gulf near Auckland. Motutapu sits right next to a volcano, Rangitoto, which would occasionally spit out ash to its neighbour. Due to this, or perhaps despite it, evidence of gardens were found on Motutapu but not only that, the ash preseved the marks made by the digging sticks used to dig the plots and even the footprints of the people as they carried baskets of sand from a stream to add to the fields. They didn't just use volcanic ash though, ash and charcoal from burnt trees, ferns and shrubs was used as well. If you remember back to our earlier episodes, you might remember we talked a bit about how Māori did a lot of burning of bush, partly to flush out moa and make them easier to hunt but also to make room for more gardens. It may have also been used to encourage fern root growth but we aren't going to talk about that right now. The ash from this burning would be left on the newly made garden to make it light and warm. In fact, this practice continued well into the European era even after those new techniques and technologies were brought over, with new tools like metal axes making the process easier. Another interesting point with this is that modifying soil may have been a uniquely Māori thing, it doesn't seem to have been practiced elsewhere in the Pacific.

Probably the most important change Māori made was the way they stored their produce. I realise that on the face of it that this may not seem like a big deal but trust me! As we talked about, before Māori arrived in Aotearoa they didn't really need to store anything. Most of their food was grown year round so it could be pretty readily dug up as and when it was needed. However, the climate in the South Pacific wasn't really a good place to use this strategy so a robust storage system needed to be developed. And develop a robust storage system they did! In particular when I say the climate wasn't very good for their current strategy, I mean in the transition from an essentially never ending planting and harvesting cycle, early Māori transitioned to an annual planting and harvesting cycle. Basically meaning they planted once at a certain time of year and then harvested that crop later on, with a gap of no planting through winter. This of course meant that they needed a way to be able to feed themselves in those months where there wouldn't be any food growing and the best way to do that is to store them properly. Since, you know, just leaving milk in the pantry isn't gonna make it last long is it? Another aspect was that Māori had also changed the way they planted kūmara and taro. Instead of taking the tops of the stalks and planting those, some tubers, that is the root part of the plant that you eat, were kept to be used as seeds for the next year. They actually would cut up a single tuber into two or three to make them go a bit further. Naturally this increased the importance of keeping the kūmara and taro well stored and ready for next year. Otherwise your whole crop for next season would be ruined before you even got the chance to plant it.

The key hurdle to overcome was the very particular conditions kūmara liked to be in so it was figured out the best place to put them was actually back in the ground, in storage pits. Those conditions were also why kūmara wasn't often stored in pātaka, those ornate storehouses on poles as they would be a bit too cold. Where early Māori may have gotten the idea for storage pits from is that they potentially already did this for yams in Polynesia. They were grown annually, planted via the tubers and stored in a variety of pits. However, that last one may not be quite correct cause it seems that the pits seen in Polynesia were actually cooking pits, not storage pits. How they may have made the connection to this is that kūmara vines when they got cold acted similar to yam vines when they got dry. Namely, withered up and died off, indicating the need to harvest.

Storage pits mostly occured where kūmara cultivation was present and were very abundant in the locations that they were found in. There is some debate as to why this is, one thought suggests that they got infected with fungus within five years, which meant new pits needed to be dug. Though there is other evidence to suggest that some pits were used for more than 70 years. Jury still seems to be out on how long they lasted but it is agreed that storage pits did have a shelf life. There were effectively three different styles or types of pits. The rua were basically small cave like structures dug into the side of a hill. They could also be dug into flat ground and entered from above. In both cases they would have some sort of wooden door or lid. A rarer varient of this was dug on flat ground and entered from an open forepit or a roofed rectangular pit. It's kinda hard to describe so I'll put some pictures up on the website to give you a better idea of what I'm talking about. The second type of pits were the bin pits which were much smaller than the rua. Unlike other storage pits, they didn't tend to have any sort of shelving or anything like that and rather than being their own independant structures they were also sometimes dug inside whare. Bin pits, sometimes called bell shaped pits, were also common across Polynesia but they were more used for fermenting breadfruit than for storage so there likely isn't a to big connection. The third type were a bit more fancy and more noticeable. These were the largest pits ranging from 2x1m to 9x6m reaching a depth of up to 1m and there are potentially even bigger ones that are yet to be discovered. These really weren't like pits in the same sense as the other two, these were more like cellars or buildings set low into the ground. They had a thatched roof, supports to hold up the ridge pole and shelves all across its walls. Some of the bigger ones even had two or three rows of poles and formed more of an aisled cellar. These would also often have drainage ditches dug into them as well, with sumps or a tunnel dug into the back that leads out of the pit. Although those are the big three, there was also another varient found in the eastern Bay of Plenty down to the north east of the South Island. These were raised rim pits which had small earth banks around the edge of the pit. Though why this was preferred over other variants, I couldn't find out. Given all these different variations of pits and how complex they were in their construction, it seems that Māori had some of the most technologically advanced storage systems when compared to other indigenous cultures around the Pacific including Polynesia, South America and South East Asia. This is most likely down to the fact that none of these cultures really had any need for an advanced storage system, the climate didn't really push the people in those areas to find a solution to the problem of cold winter storage. Cause it wasn't a problem but it was for Māori so the drive was there to find a way to solve it.

One of the interesting things about these pits though is that you find all different kinds of pits in a single area, rather than just finding one particular type. This would seem to indicate that each type filled a particular role, such as the amount of storage that was needed, whether the tubers being stored were for eating or planting which required them to be seperated, along with various grades of food tubers and whether the storage was for a community or individual. Taro was also sometimes stored in pits, which required seperation from kūmara as well. Pits weren't all about storage though, they could also be used to stop theives by making them harder to find. Another interesting point

about these pits is that they are actually pretty hard to date. The obvious thing to do would be to carbon date the timber of the doors or shelves inside. However, what comes back is dates as far back as 2000BCE. Now of course this doesn't make any sense on the face of it, humans didn't arrive in Aotearoa until about the mid-13th century so how does the wood come back as being much older? Well, it's in the way of how carbon dating works. Basically, VERY basically, living organisims are always exchanging carbon, taking it in and excreting it out. This means that the carbon in an organisms body is constantly renewed and never decays through its half life. I won't explain half lifes cause their a complicated physics term but the gist is that once a living thing dies, it stops renewing the carbon in its body, which then slowly starts to decay. Scientists can then measure this decay through carbon dating to learn when the organism died. So in our case this means that the doors of the storage pits were made of trees that died thousands of years before humans even knew Aotearoa existed.

Next time, we will talk a bit more about the gardens themselves and how they were actually made up including things like the walls, tools and the figures of gods.

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