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## **"FOOD FOR HEALTH"**

### **Non-Animal Protein Food from Tree Crops in the Mid West of WA**

The fruit and leaves of the Carob tree, *Ceratonia siliqua*, and Drumstick tree, *Moringa oleifera* provide an excellent source of clean, green, high protein, gluten free, fibre rich foods which are consumed by people all over the tropics and also people with poor dietary health problems such as type 2 diabetes, high cholesterol and high blood sugar levels.

The Carob and Drumstick trees can grow in the dry Mediterranean climate of the Mid West of WA using ground water which maybe brackish and where the rainfall for traditional cereal production is less reliable.

We grow 2,400 Carob trees on our land at Greenough, just south of Geraldton in the Mid West of WA; we also harvest and process the Carob fruit of about 4,000 trees from neighbouring farmers. We have been testing growing Drumstick trees with good results so will expand with both of these tree species in order to become Protein Farmers, first on our own land and then further east with less rain but sufficient available ground water, sometimes brackish.

*To grow 12,500/ha - need 60,000 to 100,000 litres water every year plus winter rains.*

This is the the start of a new clean, green, high protein, high fibre food industry in Australia and ultimately globally using a combination of food from the fruit and leaves of these two tree species. We will expand in order to provide an excellent quality high protein tree food to a hungry world, one with increasing poor dietary health problems and concerns about food quality and animal protein.

### **First some information about the trees and their products, starting with Carob fruit:**

With Carob trees the female cultivars are the most important in commercial groves for bearing fruit with male trees used as pollinators in a ratio of one male to eight female trees. Suitable trees can be grafted to maintain this ratio and significant pod production will start after about five years. The growth of Carob trees is a long term venture as these trees are long lived and will still be bearing fruit 120 years from now.

Carob seed/*germ* flour can yield an isolate with a protein content of around 46% with a well balanced amino acid composition. This flour is processed in Spain and used in dietary formulas for sports and people with gluten intolerance. Carob pod flour (after "Kibbling" the pod and milling the "Kibble"), contains about 50% natural sugars, 40% insoluble non fermentable fibre, around 7% protein with a high concentration of polyphenols (upto 1.7%) and tannins. The pod fibre, containing Pinitol is excellent for fighting type 2 diabetes, lowering blood sugar levels, lowering high cholesterol levels and improving dietary health.

David Kocke the Food Technologist at Freedom Foods analysed our Carob seed flour and once said to me that if we could mill it to 50 microns, then we would be a serious rival to Nestle's MILO; we need many more trees before this happens but the potential is there!

Drumstick tree leaf powder is made by powdering the dried leaves. The quantity of protein, fibre, minerals, tannin, amino acids and polyphenols from the dried leaf can vary depending on the drying method used, either direct sun or shade; these figures can also vary depending on the variety, the cultivation method and management. Whilst global figures for protein content range from 28-35%, experimental work with trees grown in Western Australia without the addition of fertiliser showed the protein content in oven dried leaves to be between 28 and 35% (figures differ according to variety).

The leaves can be eaten fresh, cooked or stored as dried powder for many months without any refrigeration and no reported loss of nutritional value. Drumstick trees are used to combat malnutrition in third world countries, especially among infants and nursing mothers. Eight grams per day of leaf powder will satisfy about 14% of the protein yields for a child aged 1-3. About 48 grams per day will satisfy nearly all of a woman's daily iron, calcium and some protein needs during pregnancy and breast-feeding. Adults and children can increase their consumption of the leaves in order to increase their protein intake.

Using the figures and details from above, it can be seen that the Drumstick tree is a good provider of nutrition.

### **What is special about these two trees:**

The Carob tree, *C.silqua* is a slower growing tree which provides healthy foods and can live for upto 120 years or more. It provides food, protein, a range of natural sugars, minerals and health benefits whilst improving the land and cleaning the atmosphere.

The Drumstick, *M.oleifera* is a rapid growing relatively short lived multipurpose tree which provides many benefits, such as those listed earlier. Oilcake from seed can be used as a flocculant to clean dirty water and the oil from the same crushed seed is on par with olive oil with a higher flashpoint. The oil can also be turned into biodiesel or a high-grade lubricant!

*The protein plus resistant starch and healthy fatty acids from the leaf are very important in the human diet.*

These two trees complement each other in providing different elements to beneficial foods, whilst at the same time greening the land and sequestering carbon.

*Rate of CO2 absorption is about 20 times higher than general vegetation.*

There are markets for the protein products around the world and we can tailor the produce from these trees to suit different markets in the world.

### **Production and delivery:**

The protein, carbohydrate, fibre, mineral and vitamin content of each of the trees, Carob or Drumstick, will depend on the location, mineral content of the soil in which the trees are planted, variety and management practises. The combination of products from these two tree species complement each other and provide a superior food product, either as a supplement or on its own.

The Tree Cropping expansion will require the tree seedlings to be grown, equipment to prepare the land, people to plant the trees, equipment to process the fruit for the intended final product, sales, marketing and personnel to manage the operation. It would create new industries and jobs whilst generating export earnings via value added Protein Food.

As a matter of interest, we have developed a method of planting using long rooted seedlings in degradable sugar beet paper pots, 195mm long, which enable a more successful strike rate than shallow rooted varieties. We have been in communication with American tree

nurseries about growing seedlings with tap roots up to 75cm long for transplanting in arid environments with suitable ground water enabling good, steady growth.

If we have the investment, we can start, first with test plots of Drumstick tree on our land and then, coupled with the Carob tree fruit, will be able to develop a new, non-animal sustainable high protein food. Once shown to be feasible we can then expand to other areas in the Mid-West or elsewhere in WA.

*Test plots:- 2 x 2.5ha or 4 x 2.5ha, with 12,500 M.oleifera per ha which will give approx 30 tonne fresh leaf/ha per year which will dry to approx 10 tonne dried leaf.*

*For oil yields, different planting ration of 1,200 tree/ha, with seed oil yield of 30-40% to give approx 2.5 tonnes (2,700 litres @ Oil SG 0.9) oil per ha per year.*

There are already companies with the final food products and we include two examples, one in USA, "Kuli Kuli" and the other "Aduna" in the UK. Both these businesses import dried Drumstick leaves from West Africa and sell in their respective country markets. We know that these type of products are also in demand in Europe, especially Holland and Germany. Quality of the leaves and contamination issues is however a huge concern from these sources. This provides us with a ready market as we have the ability to guarantee quality, clean-and-green and sustainable production so our initial sales will be to Europe.

Different Moringa varieties do have different profiles, meaning that we can generate variation in flavour so we can promote this growth among international communities to show that Australia can be a leader in Sustainable Alternative Protein Tree Cropping with "Clean Green Australian Tree Crops For Alternative Proteins."

It will take time and patience, after all, this is tree growing and the Mediterranean people say that growing Carob trees are for your grandchildren. With the Drumstick tree however we can look after ourselves and our children.

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## CAROB & DRUMSTICK TREE CROPPING

SAFE, SUITABLE, SUSTAINABLE agriculture -  
adaptable to the **Mid West's drier Mediterranean climate**,  
starting with:-

### Stage 1.

We already grow 2,400 Carob, about 1,000 Neem and test grow Drumstick trees. Now setting up for Carob processing & want to start Drumstick tree growth/processing industry.

We have now received letters from:

1. Five neighbours, growers of Carob trees, who will sell product to A.A. & A Pty Ltd;
2. One broad acre farmer in the Morawa area who, with broad acre farming friends, is willing to plant Carob/Drumstick trees for eventual product and processing in Morawa area;
3. Mid West Development Commission support to make Tree Cropping economically viable;
4. Mid West CCI support for Carob Tree Cropping industry expansion in the Mid West;
5. WA DPIRD support for economically viable Mid West Drumstick tree industry;
6. The Chairman of Carobs Australia with endorsement of all the necessary elements involved with the build up of the Carob industry.

In addition to the above, we have:

1. Expression of Interests from several Australian food businesses for purchase of Carob flour, Carob fibre and Carob syrup, starting 2019.
2. EOI's - two Australian Mediterranean food importers for regular supply WA Carob products.
3. WA DPIRD support to export Drumstick tree alternative protein food to EU market.

**Stage 2:** Will involve purchase/leasing of neighbouring lands for preparation/start up of Carob industry development, Drumstick Tree growth/industry development. Set up Food Processing shed for Carob/Drumstick product. Use "Tree Cropping - A Permanent Agriculture" involve trees, grain and livestock. Other trees such as Jujube, arid land Oak can be grown to provide sheep fodder from acorns, cork and eventually quality timber.

**Stage 3 :** Will involve the purchase/leasing of land in the Morawa (Mid West of WA) region for all of the above growing activities along with start up of a complete new Food Standards Carob processing facility & expand Drumstick tree growing/processing. We have a farmer in the Morawa area willing to take up Carob/Drumstick tree cropping with the aim of establishing a Carob fruit/Drumstick tree processing mill; other Morawa farmers have expressed interest in selling product to this set-up.

**1.Carob, *Ceratonia siliqua*, member of the legume family, with premium health food, unique healthy products from the fruit:**



**Carob flour, fibre and syrup** are important health foods which are beneficial in the control of many health problems such as diabetes, heart diseases and colon cancer due to the diabetic, anti-oxidant and anti-inflammatory activities. The target market for the **Carob fibre and syrup** is the ever growing number of diabetic people with high cholesterol and dietary ill health, about 10% of the Australian population and an increasing percentage of the Asian population.

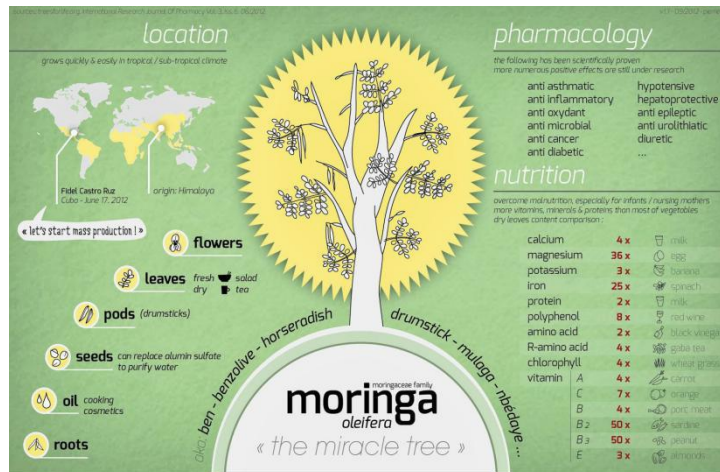
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## 2. Drumstick tree, *Moringa oleifera*



- Thrives in hot & dry conditions; a good soil improver with edible green leaves rich in protein, iron, calcium, amino acids & vitamins;
- Leaves provide a sun shade in hot climates under which other plants/trees, such as Jujube can be grown, also excellent livestock fodder;
- Seedpods high in protein & omega 3 fatty acids. Export leaf protein product to EU;
- Good for reclaiming degraded saline land/producing biodiesel.

## 3. Jujube, *Ziziphus jujuba* a tasty fresh fruit for the Mid West climate:



### MidWest Times

24<sup>th</sup> February 2016

### JUJUBE FRUIT

A drought and saline resistant fruit plant, a popular Asian delicacy, able to be grown in the Mid West.

Jujube trees fit very well into the Tree Cropping/Agroforestry system of compatible leguminous companion trees. Multiple cropping of Jujube with Carob, Drumstick & Neem trees when using adequate tree spacing, can be undertaken which will improve the soil quality. The Jujube tree is drought tolerant with a deep taproot and a moderate tolerance for saline soils. The fruit can be exported fresh to S.E. Asia or China.

## 4. Neem, *Azadirachta indica*, these trees provide the world's best natural insect deterrent/plant protectors and soil improver:



Use Neem as a drought/saline tolerant tree for organic insect and animal repellent properties around the perimeters.

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4. Portuguese Oak, *Quercus lusitanica*, semi-evergreen tree, suitable to dry Mid West climate, excellent summer shade trees, fire retardant, cattle fodder from acorns, upto 20m:
6. Cork Oak, *Quercus suber*, an arid land, long living tree to produce Cork, cattle fodder from acorns, summer shade, conserving soil against wind erosion:
7. Honey - beehives placed among groups of trees for different varieties of honey; a big market in Asia for organic honeys:
8. Grain cropping between tree rows, with the trees providing shelter from the elements:
9. Livestock, graze Dexter cattle & sheep, between trees when tall enough, with the trees providing shelter from the elements.

**Carob Tree Cropping Agriculture, using  
Neem for insect deterrent purposes is ..... SAFE!**

**By growing deep rooted, water-holding  
Carob, Drumstick, Neem, Jujube, & Oak it is ..... SUITABLE!**

**By allowing crop-production in dry lands,  
And helping to reduce climate change it is ..... SUSTAINABLE!**

**These trees will be still producing fruit and feeding people  
in 150 years!**

**The best time to plant these trees was 20 years ago, the  
second best time is NOW.**

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