











**Picture 3:** Taro Plant (Latin: *Caladium Sp*)  
 (Local Muna: *Tonea*)

#### 4.4 Corn (*Zea Mays*)

South East Sulawesi is one of the corns producing areas that considerable potential. One of corn planting area in South East Sulawesi is Muna Regency with productivity about 2.15 ha (Department of Agriculture Muna, 2014). The low of productivity partly caused by soil fertility problems, the low of improved varieties using and crop management also the environment that have not been carried out intensively through available technology (Muliadi A. 2003).

##### Production

Corn production in Muna Regency South East Sulawesi Provinces is one of mainstay food and include on one of icon after paddy. Generally, harvested area and production of corn plant from year to year also experience the fluctuations. This condition can be seen on the following Table 6.

**Table 6:** Harvest Area and Corn Production

Category	Years				
	2009	2010	2011	2012	2013
Harvest Area (Ha)	13.698	19.532	14.021	17.312	13.175
Production (ton)	35.541	49.263	32.679	42.017	30.272

Source: BPS (Muna Regency, 2014)

Based on the table above, it shows that the number of corn crop production experience the fluctuations. This is caused the decreasing of corn crop in harvested area in which in 2010 amounted to 19.532 hectares decrease to 14.021 hectares in 2011. Additionally in 2013 also experience the decreasing because most of the land for corn planting was settled by community. The highest growth of food production in Muna is corn that approximately 48.06 percent of corn production in South East Sulawesi.

##### Price

Commodity Futures Trading Supervisory Board, Thursday (15/9/2011) reported trading price of corn in CBOT (*Chicago Board of Trade*) is closed in a position to rise. The price increase is influenced by their predictions about the amount of corn production in 2011 issued Agriculture Department of US, states that US corn production this year will be decrease 57 million bushels (1 bushel = 35.239 liters) to 12.497 billion bushels, compared to last year's production.

In addition, the increase of corn price also caused by the impact of crude oil prices rising, which sparked speculation the increasing of corn need as ethanol feedstock. Corn futures for September 2011 delivery closed at 713 dollars per bushel or higher 3.6 points. Meanwhile, corn prices at the retail level in Kendari, Southeast Sulawesi stable at Rp 4,000 / kg. Dry corn is still supplied from Muna as the center of corn producer in South East Sulawesi.

The supplies of corn local production are not enough to meet demand of milling and livestock in this area, and only able to meet the individual needs to be consumed, so it must be supplied from outside the South East Sulawesi.

##### The Nutrient Content and Health Benefits

In Indonesia, there are two varieties of corn that have been planted in general, ie yellow and white corn. The substances content of yellow and white corn are presented in the following Table 7.

**Table 7:** Nutrient Content New Harvest Yellow Corn (100g)

No.	Component	Content
1	Water (g)	24
2	Calorie (cal)	307
3	Protein (g)	7.9
4	Fat (g)	3.4
5	Carbohydrate (g)	63.6
6	Ca (mg)	9
7	P (mg)	148
8	Fe (mg)	2.1
9	Vitamin A (SI)	440
10	Vitamin B1 (mg)	0.33
11	Vitamin C (mg)	0

Source: Data from national nutritional content, 2014

The part of corn that rich in carbohydrates are the seeds. Most carbohydrates are in endows premium. Carbohydrates content can reach 80% of the dry seeds. Carbohydrates generally in the form of starch a mixture of amylase and amilopektin. In corn glutinous, most or all of the starch is amylopectin.

Corn plants are very useful for human and animal life. In Indonesia, corn is the second most important food after rice. In Madura, corns are used as main food. Recently the use of corn plant is getting increase. All of corn crop are pointless, because almost all parts of the plant can be used for various purposes, among others:

- a. Young stems and leaves: fodder
- b. The old (after harvest) of Stems and leaves: green manure or compost
- c. Dry stem and leaf: firewood
- d. Corn stalks: trellis (pillar)
- e. Corn stalks: pulp (paper material)
- f. Fruit corn (putren, Jw): vegetables, barged, fry sauce
- g. Old corn kernels: a substitute for rice, morning, popcorn, corn bread, flour, rice noodles, a mixture of ground coffee, biscuits, pastries, fodder, raw materials of beer industry, pharmaceutical industry, dextrin, adhesives, textile industry.

So beside as a source of carbohydrates, corn is also grown as fodder (forage and cob), extracted oil (from seed), made of

flour (from seed, known as cornmeal or cornstarch), and raw materials industrial (from seed flour and cob flour). In addition, some studies show that the chemical compounds that contained in corn is beneficial for health, among others:

a. *Energy Giver Substance or Nutritional energetic Substances*

Energy giver substances consist of carbohydrates, fats and proteins. Three of reviews these substances the oxidation process in the body that produce energy in the form of heat. The body will convert heat into mechanical energy or motion. The energy that generated is expressed in caloric units. Energy converted by the body into energy for muscle activity.

b. *Substance of Body tissues Shaper Cell or Plastic*

Nutrients forming cells of body tissues consist of protein, minerals, protein and water. Although including energetic group, principally the function is to form the tissue cells.

c. *Substances of Nutritional as Regulatory Function and Biochemical Reactions in the body or substance of stimulant Nutrition*

The content of nutrients/vitamins in corn functions similarly to the hormone. The different function is, hormone made in the body, while vitamins should be taken from food. Corn has a lot of energy content, vitamins, minerals and protein. The content of these substances can be used to build muscle cells and bone, build brain cells and the nerve system, prevents constipation, lowers risk of cancer and heart disease, and prevent hole tooth. The fiber of corn also can help the digestion.

According to other literature sources, corn is also believed to be a drug. The corn used is corn that can be found in traditional markets and supermarkets. Here are some types of diseases that can be addressed by corn, such as:

1. Launched of Urine, amount 50 g fresh corn hair washed boiled with 1 liter of water until the water a half. The potions drink twice daily.
2. Hypertension, handful of corn hair washed, boiled with 1 liter of water. The boiled water is to drink twice daily. After the blood pressure is decrease, this herb is still drunk once in a day.
3. Diabetes, a total of 50g of corn hair washed, boiled with 2 cups of water. Cooking water taken twice daily.
4. Mother's Milk Smoothing, some parents roasted corn kernels to crack and crisp. Eat as a snack, or the corn boiled alone.
5. Used as Smallpox Scars, amount 10 pieces of young corn shredded and bandage to Smallpox scars. Repeat for a few days.
6. Diarrhea, corn cobs washed and ground into powder. Pour into 1 cup of water. Then herb taken twice every day. The research result that conducted by Sukensri Hardianto, 1989. Faculty of Pharmacy, UGM on the effect of infusion of young corn cobs to the solubility of calcium kidney stones in vitro studies suggest that there is an influence of the infusion and potassium levels were dissolved in the solution, and calcium kidney stones has solubility greatest in young corn cob infusion with 5% levels. At higher levels of infusion solubility decreased. The part of corn that used is hair and young cobs, which can be used to treat: gallstones, kidney stones, dropsy in

renal inflammation, abdominal edema, hepatitis, diabetes, gall bladder inflammation, cirrhosis, and high blood pressure. Here are the ingredients and measuring.

7. Empe Stone, remedy: 5 cobs of young corn, 5 grams of fresh cat's whiskers herbs, and 110 ml water. Directions: made infusion. How to use: Drink 1 time in a day as many as 100 ml. Duration of treatment: repeated for 14 days.
8. Kidney Stones, remedy: 4 cobs of young corn, 1 handheld of corn hair, 8 strands of porcelain Keji fresh leaves, and 110 ml of water. Direction: made infusion. How to use: drink 100 ml 1 time in a day. Duration of treatment: repeated for 14 days. After the stone out, either in the form of pebbles, granules or froth treatment is stopped, and then forwarded to drink herbs and Meniran of Cats Whisker.
9. High Blood Pressure, remedy: 5-7 cobs of young corn, 1 handheld hair of corn, and 110 ml of water. Directions: made infusion. How to use: drink 100 ml 1 time in a day. Duration of treatment: repeated for 7 days. Beware on the use of corn hair carefully because blood pressure can decrease quickly.

Corn cob can also be used as a basic ingredient of making xylitol. Xylitol is an intermediate in the metabolism of carbohydrates in the human body with a speed of between 5 to 15 grams per day. The chemical formula of xylitol expressed as  $\text{CH}_2\text{OH}(\text{CHOH})_3\text{CH}_2\text{OH}$  with a molecular weight of 152.1. Xylitol can absorb into the body more slowly than glucose. Thus, the rise in blood glucose can suddenly block. Because of this reason, xylitol is also often used as a sucrose substitute for diabetics.

Another interesting thing of corn for health benefits is the presence of several studies that show that by consuming sweet corn that has been cooked can reduce the risk of suffering from heart disease and cancer. Expert medical experts from Cornell University have proven that eating sweet corn can increase the levels of antioxidants, although the level of vitamin C in the corn is reduced. The rate of oxidation is measured by its ability to ward off free radicals that cause damage to the body. Sweet corn can also increase the levels of ferulic acid, which can prevent cancer.

#### **Marketing**

Corn Products in Muna Regency South East Sulawesi Province, are now beginning to enter the inter-island market of Java, especially in Surabaya and Bali to fulfill one of the corn flour manufacturing industry raw materials needs and also animal feed.

As early scarce, people in District Kabangka already conducted the inter island marketing of yellow corn by Tondasi ferry port to Makassar (South Sulawesi) and then send to Surabaya. In the presence of Tondasi ferry port, farmers who had only send their commodity in Buton and Kendari through a port in the city of Raha, but now by the presence of transportation can directly outside the region of Muna island such as Makassar and Surabaya.

During the Tondasi ferry port enabled, almost all agricultural products, plantation, fishery an immediate farms can be marketed through the port which is only not more than 20

kilometers from Raha city. The condition regarding to corn in Muna Regency of South East Sulawesi Province can be seen in the following Picture 4.



**Picture 4:** Corn (Latin: *Zea Mays*)  
(Local Muna: *Kahetela*)

5	Calcium (mg)	14
6	Phosphor (mg)	49
7	Ze (mg)	1
8	Vitamin A (SI)	0
9	Vitamin B1 (mg)	0.05
10	Vitamin C (mg)	4

Source: Data from national nutritional content, 2014

#### Marketing

Gembili (*dioscorea esculenta*) products in Muna Regency South East Sulawesi Province are now beginning to go in between regions market, especially Buton, Bau-Bau and Kendari to fulfill one of the basic needs of people in South East Sulawesi. Besides that, some are sent to Makassar and partly sold away to Java Island.

The condition of Gembili in Muna Regency of South East Sulawesi can be seen in the following Picture 5.



**Picture 5:** Gembili (Latin: *Dioscorea Esculenta*)  
(Local Muna: *Ghova*)

#### 4.5 Gembili (*Dioscorea Esculenta*)

##### Production

Gembili (*dioscorea esculenta*) is one kind of tubers that life in South East Sulawesi, especially in Muna Regency. This plant is one of public consumption ingredients. Besides that, is also a rice substitute commodity in Muna Regency? Generally, harvested area and plant production of Gembili (*dioscorea esculenta*) from year to year also experienced the fluctuations that can be shows in the following Table 8.

**Table 8:** Harvest Area and Gembili Production

Category	Years				
	2009	2010	2011	2012	2013
Harvest Area (Ha)	187	168	145	157	149
Production (ton)	176	189	171	175	163

Source: BPS (Muna Regency, 2014)

##### Price

The price of Gembili (*dioscorea esculenta*) crop commodity in Muna Regency South East Sulawesi Province is still low. Based on BPS data, the price of Gembili (*dioscorea esculenta*) plant for factory standard quality at Rp 530.00 /kg, from Rp 770/kg. Then, the price of Gembili (*dioscorea esculenta*) in random stall level (traders) Rp 790/kg, which was previously Rp 760/kg. The increase of Gembili price is low enough, ranging from Rp 600- Rp 900/kg, so the price can penetrate up to Rp1. 100/kg.

##### Nutrient Content and Health Benefits

Gembili (*dioscorea esculenta*) is commonly consumed as foods by Indonesian people. Gembili (*dioscorea esculenta*) is one of plant tha has much nutritional content. The nutrient content of Gembili (*dioscorea esculenta*) can be described on the following Table 9.

**Table 9:** Gembili Nutrient Content (100 gram)

No.	Component	Content
1	Energy (cal)	95
2	Protein (g)	1.5
3	Carbohydrate(g)	22.4
4	Fat (g)	0.1

#### 5. Conclusion

Economically, plants that cultivated by people in Muna Regency South East Sulawesi province in the form of cassava, sweet potato, taro, corn and Gembili (*dioscorea esculenta*) that beneficial for alternative to non-rice consumption in the context of national food security.

Economic studies on the consumption of non-rice alternative form of production, price, nutritional content and marketing experience the fluctuation. However, the situation of abundant production and the price is quite cheaper compared to rice, so that the reach of the community are fulfill.

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