



Effect of Nitrogen Fertilizer and Organic Fertilizer against Physical Properties of Corn Starch Local Manado Yellow

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Abstract : The local Manado yellow corn starch of several treatments has been isolated and studied physical properties. starch insulation is carried out by wet milling method, which includes the following stages of processing: coarse grinding, soaking in warm water, wet destruction, centrifugation, washing of the precipitate and drying. Starch obtained by analysis calculation rendemen, and physical properties of starch in the degree of white, shape and size of granules, repos angle and density of kamba. The purpose of this research is to know the basic about physical properties of local corn starch component of Manado yellow. The result of this research showed that there was no significant difference between the treatment of local maize of Manado yellow in the case of rendemen. Other parameters showed that there was significant difference between the local Manado yellow corn treatment.

Introduction

The local corn of Manado yellow is a local North Sulawesi variety of strategic and economically viable corn varieties that can be developed as non-rice food alternative food. So far, the potential of maize in North Sulawesi is quite large with large area of land, but the productivity of maize is still low, ie about 2-3 tons of ha⁻¹ at farmers level (Tamburian, 2011). According Lihang (2013), Dry kiln weed per hectare 2.97 t ha⁻¹. The Government of North Sulawesi Province has implemented Crash Program to increase corn production, both in quantity and quality since 2005. With this optimization movement, it is hoped that corn development in North Sulawesi will be fully and integrated, from increasing production, distribution, marketing to processing .

One of the important corn processing products is starch, the use of corn starch is very wide, both as food and non food. The starch is in the form of granules collected in the seeds. Starch granules are generally resistant to the various processes used in the processing of starches as foodstuffs.

Until now not many research reports starch content, yellow corn Manado in the framework of the development of non-rice alternative food products. This study aims to increase production and characterize the physical properties of local Maize yellow corn.

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Methods

Isolation Corn Starch

Isolation of corn starch, first dried corn kernels are grinded so as to obtain particles that are sized like rice and then washed with cold water to separate the skin and the body. During leaching, the skin and the body will float so easily separated from the endosperm. The remaining material is then immersed in hot water at 50°C for 24 hours, after which it is destroyed in a blender with the addition of sufficient water to form a book like endosperm. The slurry is pH-set between 8.5 to 8.7 and then centrifuged to separate the protein.

Rendement is determined by comparing the weight of starch obtained to the total weight of the corn seeds used. The calculation of the yield is based on the dry weight of both starch and the material of origin.

The shape and size of the starch granules was determined using a microscope equipped with a micrometer. The starch suspension is made by mixing the starch with distilled water, then dripping on the glass of the object, then covered with a cover glass. Observations were made with 400 times magnification, and performed four times.

Corn starched repos angle is measured by pouring starch onto a flat surface from a height of 10 to 15 cm. The calculation of the repos angle is done by measuring the height and the base of the hill, and the repos angle can be determined using the following formula:

$$\text{Angle of repos} = \arctan \frac{\text{height}}{\frac{1}{2} \times \text{wide area}}$$

Measurement of density of kamba is done as follows. The starch is poured into a container already known to the volume from a height of 10 to 15 cm, then flattened from one direction with a ruler. The starch that is accommodated is weighed. Furthermore, the density of kamba is calculated by the following formula:

$$\text{Density of kamba} = \frac{\text{sampel weight (g)}}{\text{volume (ml)}}$$

The degree of white starch is measured using the color difference computer tool. From the measurement results obtained values L, a and b, then incorporated the following formula:

$$W = 100 - [(100 - L)^2 + (a^2 + b^2)]^{0.5}$$

W = white degree

100 = the most perfect white value

L = brightness

a = red if marked + and green if marked -

b = yellow if marked + and blue if marked -

The shape and size of the starch granules were seen using a microscope equipped with a micrometer and the results were photographed with the camera, at 400 times magnification, for all treatments. The isolates on each starch treatment obtained showed the same shape and size, the starch granules were polygonal in size ranging from 25 to 130 microns. Corn starch granules have a hilum contained in the middle.

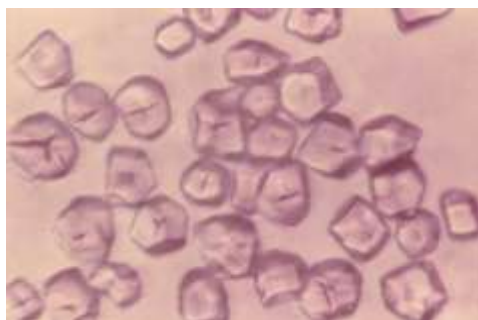


Figure 1. The shape of corn starch granules viewed with a microscope at 400 times magnification

Degree of White Starch

The degree of white starch in all treatments of the average values obtained ranged from 90.93 to 94.92%. Treatment at P4 (organic fertilizer 10 ton / ha plus 150 N kg / ha) has the highest value of all treatments studied, While P1 treatment has the lowest value, the yellow color in local Maize Manado yellow is caused by yellow pigment, ie carotenoid contained in endosperm which in the process of extraction is not all lost, there is still some attached to the starch granules.

Kamba Density

The density of kamba isolate of starch has an average value of 0.59 g / ml. The higher density of the kamba indicates that the product is more dense, in the same volume the product has a heavier weight. The results of statistical analysis showed that among the treatments studied there was a significant difference regarding the density of local corn starch yellow Manado cassava. Furthermore, treatment of P4 (organic fertilizer 10 tons / ha plus 150 N kg / ha) was significantly different to other treatments, while among the other four treatments there was no significant difference.

Angle of Repos

Angle repos obtained average value is 35.59°. It turned out that among the treatments studied there were significant differences regarding the angle of corn starch repos. Furthermore P5 treatment was significantly different from other treatments. The treatment of P3 was not significantly different from P4, but was significantly different from other treatments, as well as P1 treatment was not significantly different from P2 treatment but significantly different from other treatments.

Rendement

The yield of starch from each treatment obtained was the average value of 9.65 to 10.82%. The highest value is in the treatment of P4 and followed by P3 and P5. It turns out that the static analysis shows that there is no significant difference about the average value of yield among the treatments studied. Please note that this research is more focused on the characterization needed for the process of using the next starch.

Table 1. Presentation of white starch degree, density of kamba, repos angle and starch yield Local corn of Manado yellow

Perlakuan	Derajat Putih Pati (%)	Densitas Kamba (g/ml)	Sudut Repos (°)	Rendemen (%)
P1	92.90 ^a	0.60 ^b	34.16 ^b	9.82 ^a
P2	94.75 ^a	0.61 ^b	36.25 ^b	9.87 ^a
P3	94.62 ^b	0.61 ^b	39.69 ^c	10.24 ^a
P4	94.93 ^c	0.56 ^a	39.39 ^c	11.38 ^a
P5	94.26 ^b	0.60 ^b	28.50 ^a	10.41 ^a

Description: The same small letters show no significant difference at the 5 percent test level of Duncan's multiple-range test

Conclusion

The local Manado yellow corn starch isolate from some of the treated treatments has granules that are generally polygonal in size ranging from 25 to 130 microns. White degrees ranged from 90.93 to 94.92 percent. The highest and lowest P4 treatment P2. The Kensa Density value ranges from 0.56 to 0.61. Apparently there is a significant difference in each treatment regarding the density of local corn starch yam Manado dumplings. The repos angle value ranges from 28.50° to 39.69°. The magnitude of the repos angle is influenced by the type of material, water content, shape and size of material. The corners of the repos are important in terms of storage and packaging of materials. The yield obtained ranged from 9.65 to 10.82 percent. The average value is 10.11 percent.

Apparently there is no significant difference about the value of local corn starch yield of Manado yellow among the treatment. Nevertheless the value is very low due to the process of accracy used is not perfect.

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