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# THE QUALITY TEST OF THE BURNT VETIVER (VETIVERIA ZIZANIOIDES) WASTE UTILIZATION AS AN ECO-FRIENDLY MATERIAL POT

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***Abstract***

*Essential oils of vetiver is an industrial and trading commodities in the international market that plays an important role for the perfume, medicine, and cosmetic industries. But the distillery for 12 hours from 1 ton vetiver produced only 4 liters of essential oil and of course a lot of waste that has accumulated. The purpose of this research are to overcome the industrial waste of vetiver treatment without the continues pollutant, to get the view about the mix pot from the vetiver waste technically and to know the quality of the pot made from vetiver waste. Making the sample is started with the selection between the burnt vetiver waste, cement and sand. Then making sample with the form like a pot that has the up diameter (31,3 cm), the bottom diameter (20,3 cm), highty (30 cm), and the mass of vetiver waste pot (5,52 kg) and the mass of reguler pot (5,36 kg). From the research that has been done, it can to get the conclusion that the vetiver waste pot has better quality than the reguler pot (cement pot). It reviewed from the power of the vetiver waste pot has a power until (583,78 kgf), while the reguler pot has just (410,34 kgf). Besides, this pot can save up to 30% of the cost of production and exactly it eco-friendly.*

**Key words:** *Vetiver waste, pot, commodities, eco-friendly, saved cost.*

## INTRODUCTION

Nowadays, West Java agribusiness and agro-industry has not treated optimally, but actually based on natural characteristics and the diversity of natural resources are very supportive. It is not surprising if it is used as a target in the strategic plan of the future development in of West Java province, with the agricultural sector (agribusiness and agro-industry), which became the leading sectors of West Java, especially in increasing revenue. It also wants to be a mainstay of the local government in improving Indonesia Development Index (HDI), especially in overcoming the impact of the prolonged economic crisis today (Kastaman 2003).

Essential oil is a commodity industry and trade in the international market plays an important role, especially as industrial raw materials that can reach billions of U.S. dollars. For instance, the price of 1 ounce of vetiver oil could reach 25.4 U.S. dollars. If the value is in the exchange rate of the rupiah in it, so for 1 ounce oil it can be range on Rp.228.600,-or USD 2,286,000.00 per kilogram of material (Kastaman, 2003).

So many essential oil in Indonesia, such as patchouli oil, clove oil, vetiver oil, lemongrass scented oil, eucalyptus oil, ylang oil and many more. One of the efforts to further develop the potential of essential oils, especially vetiver oil in Garut Regency, this time in the 'Uras' Cooperation in Bayongbong District, Garut Regency, has tried to build centers of production and oil refining vetiver. Product value of Garut Regency vetiver oil. Annually, reach Rp22, 5 billion under management 1508 farmers from an area of 1850 ha with a volume product vetiver 31,450 tons per year and 25 tons of oil per year (Between West Java Magazine March 24, 2009, the value of vetiver oil product in Garut Regency is Rp 22.5 billion, Johny Dody Hidayat). While the distillation process each ton of vetiver for 12 hours only produce 4 liters of oil at a price of Rp 900 thousand per liter and production costs Rp 2, 25 million, making it the benefit of farmers at about Rp 1, 4 million (Haeruman, Head Plantation Office Garut).

However, the processing of waste volume certainly gained considerable refining. Indeed, there are several ways of processing done by

the community, but still very simple. The community make the waste to make the compost mixture, but in the process the waste piled up in advance amounted to much. The impact is make the bad view, and in the accumulation of the highly pungent smell due to the persistence of the essential oils that are not perfectly distils that interfere with the surrounding air. Later, due to of the other accumulation is the water accumulation. Possibly, due to rain water that seeps in landfills vetiver it can seep into the soil and disrupt the existing groundwater conditions which in the beneath. Following the accumulation, the people burn it. Following hoarding, the people and then burn it. Here the problem arises again, the smoke produced disturb the surrounding air and can cause respiratory infection. Therefore, further research is needed to solve these problems with eco-friendly principles.

The purpose of this activity are to overcome the industrial waste of vetiver treatment without the continues pollutant, to get the view about the mix pot from the vetiver waste technically, and know the quality pot that made from waste vetiver

Based on empirical observation we get the information that vetiver waste is still a problem for the environment around them because of the bad smell and bad view. The most simple and quickly done by the most farmers in agro-industrial centers vetiver to handling of vetiver waste is by burning so the smoke that produced make the pollution impact.

One alternative solution to overcome this problem is with analyze the waste material that is used as a raw flower pot material. It is necessary to look at the possibility of waste utilization so that it can overcome the significant environmental issues surrounding the vetiver oil refining industry. In addition, it is expected to add the value of vetiver waste as an additional income for farmers and industrialists vetiver.

## MATERIALS AND METHODS

This research were conducted in the centra of vetiver waste production which is manage by Vetiver Uras Cooperation Bayongbong District, Garut Regency during February until May 2012. This research use descriptive method with material characteristic analysis and press testing in Material Test Laboratory Department of Mechanical and Biosystem, and seepage testing in Cikabayan Green House Laboratory. Department of Agronomi and Horticulture Department, Bogor Agricultural University (IPB).

## RESULTS AND DISCUSSIONS

Waste handling that conducted in the field is still inadequate and still cause pollution, in connection with the burning of waste after the distillation process is often done by many farmers (Figure 1). Smoke produced still contains essential oils so smell of smoke more pung ent. (Kastaman, 2003).

Figure 1. The Vetiver Waste Management by Burning that Caused a Lot of Negative Impact

The negative impact by (Kastaman, 2003) is that currently felt by the public about waste management with burning among others: air pollution, water pollution by residual materials / waste, plants in around the pile of waste experiencing barriers to growth, need extensive burning land so that the land is less productive.

**The Production of Vetiver Waste Pot**

The first step in the manufacture of vetiver waste pot is cut the vetiver into small pieces, The materials that is specified the mixture stirring until evenly (for the composition, the main dough: vetiver waste, cement and sand, while the coating dough: white cement, traso, and mil) then Prepare the pot mold and lid the flower pot mold, used motorcycles oil (grease) to lubricate the pot mold that that will be used to make the pot. This is to facilitate the separation of pot from from the mold, the original pot is not sticky Then, put the dough into the mold and trim while holding and rubbing to get a solid pot and a surface flat. The coating dough that contains of mixture water lubricated to the surface of the pot mold, this is to give color to the outer surface of the pot

before it is printed using the main dough The bottom of the mold pot gived the main dough. After the coating dough is evenly, then covered again with the main dough that it mixed with the water as the main ingredient pot. After it spread evenly, sprinkle the main dough without water, to strengthen those pot. When the main dough is evenly distributed on the mold, we sprinkle again with coating dough to give color to the inside of the pot.

After everything is evenly distributed, the inside of the pot must be be smooth using smoother scoop. So do with the mouth of the pot, it also must be smooth using smoother scoop. The thickness of the pot that will be produced is about 5cm. The pot mold left for about 5minutes, then the pot mold reversed slowly to remove the pot from the mold. The bond rubbers is removed one by one from the mold, then the pot is placed in the shade to avoid the direct sunlight.

The Maintenance ProcessMove the vetiver waste pot that printed to the protected place from the sunfor for 12 to 24 hours, until the flower pot come tobe hard.

The placement of flower pot in the shelter should be up and squeezed between the head and the head, so do the leg and the leg of flower pot, so that the surface are ot broken and the placement of the bottom side of the vetiver waste waste should be given as the base. The room should be covered and kept holding the air circulation so that the pot does not stricken direct of the sunlight. The cooling process should be performed by air drying or rather dried. This Drying is carried out for three days o rperceived vetiver waste pot is dry.


Figure 2. Manufacture of vetiver waste process (1) Vetiver waste is cut in to small pieces (2) Vetiver waste is mixed with cement and sand (3) Stir it so that the dough distribute evenly (5) The printing dan (5) And that is teh eco-friendly vetiver waste pot.

**The Results of Seepage Test and Pressing Test**

1. The Results of Seepage TestThe seepage test is did on the pot by putting water into the pot until it full during 24 hours. When the seepage test, the pot with normal material and the vetiver waste pot are fulfilled with the same water during 24 hours. Start at 08.00 a.m on May 5$^{th}$ 2012 until 08.00 a.m on May 6$^{th}$ 2012.

Table 1. The Seepage Test Result of Vetiver Waste Pot and the Normal Pot

| The Repetition | The Reducing Water (cm) | |
|---|---|---|
| | Vetiver Waste Pot | Normal Pot |
| 1 | 3,50 | 7,50 |
| 2 | 3,50 | 3,50 |
| 3 | 3,50 | 3,50 |
| 4 | 3,75 | 3,50 |
| 5 | 3,50 | 4,50 |
| 6 | 3,50 | 3,50 |
| 7 | 3,50 | 3,50 |
| The Average | 3,54 | 4,21 |

The vetiver waste can absorb the water 3.54 cm in average and the normal pot can absorb the water 4.21 cm. This indicates both vetiver waste pot and normal pot able to meet one of the requirements of good pots that can absorb the water.

2. The Result of Pressing Test

Table 2. The Data of the Pressing Test Result of Vetiver Waste Pot

| The Repetition | Vetiver Waste Pot | | Normal Pot | |
|---|---|---|---|---|
| | Massa (Kg) | The compressive strength (Kgf) | Massa (Kg) | The compressive strength (Kg) |
| **$0^0$ Position** | | | | |
| 1 | 5,030 | 430,0 | 5,867 | 675,0 |
| 2 | 5,040 | 307,5 | 5,420 | 530,0 |
| 3 | 5,595 | 497,5 | 4,957 | 266,5 |
| 4 | 5,700 | 515,0 | 5,250 | 381,3 |
| 5 | 5,625 | 502,5 | 5,625 | 350,0 |
| 6 | 5,270 | 745,0 | 5,200 | 177,0 |
| 7 | 5,265 | 500,0 | 5,130 | 247,5 |
| 8 | 5,420 | 425,0 | 4,945 | 230,0 |
| 9 | 5,235 | 447,5 | 5,630 | 165,0 |
| 10 | 5,350 | 725,0 | 5,050 | 560,0 |
| 11 | 5,165 | 442,5 | 5,670 | 257,5 |
| 12 | 5,750 | 327,5 | 4,680 | 127,5 |
| **Rata-rata** | **5,370** | **530,4** | **5,285** | **330,6** |
| Posisi $180^0$ | | | | |
| 1 | 5,180 | 400,0 | 5,290 | 376,0 |
| 2 | 5,685 | 807,5 | 4,935 | 275,0 |
| 3 | 5,830 | 1015,0 | 5,025 | 457,5 |
| 4 | 6,090 | 632,5 | 5,495 | 227,5 |
| 5 | 6,060 | 1015,0 | 5,020 | 352,5 |
| 6 | 5,395 | 325,0 | 6,190 | 1312,5 |
| 7 | 5,435 | 397,5 | 4,880 | 127,5 |
| 8 | 4,945 | 650,0 | 6,295 | 847,5 |
| 9 | 5,280 | 552,5 | 5,415 | 105,5 |
| 10 | 5,395 | 1251,5 | 5,620 | 885,0 |
| 11 | 5,520 | 501,5 | 4.410 | 395,0 |
| 12 | 5,585 | 826,5 | 5,591 | 605,0 |
| **Rata-rata** | **5,533** | **697,9** | **5,347** | **497,2** |
| **Rata-Rata Total** | **5,452** | **614,2** | **5,316** | **413,9** |

The waste vetiver flower pot crushed when the weighted average 583.78 kg of 25 experiments. While the normal pot crushed when given load average 410.34 kg of 25 experiments. It can be seen from the graph the test results.

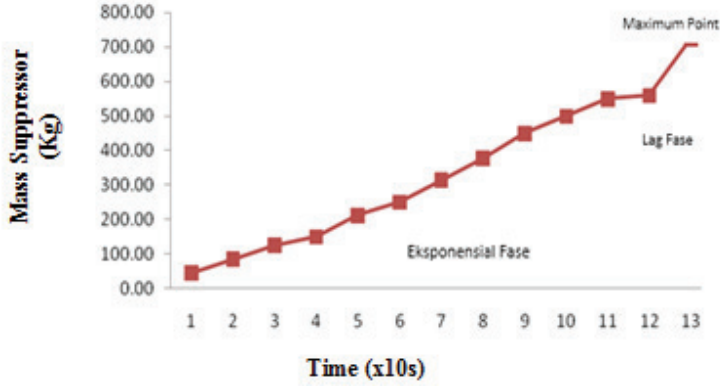


Figure 3. Exponential curve vetiver waste pot endurance per-ten seconds and maximum durability point

Imposition of the pot is done every 10 seconds and the load mass increases (see figure 2) every 10 seconds too. On the curve is seen that exponential phase happen followed by a lag phase that states the force pot threshold and the death phase of pot declared maximum power and started to crack.

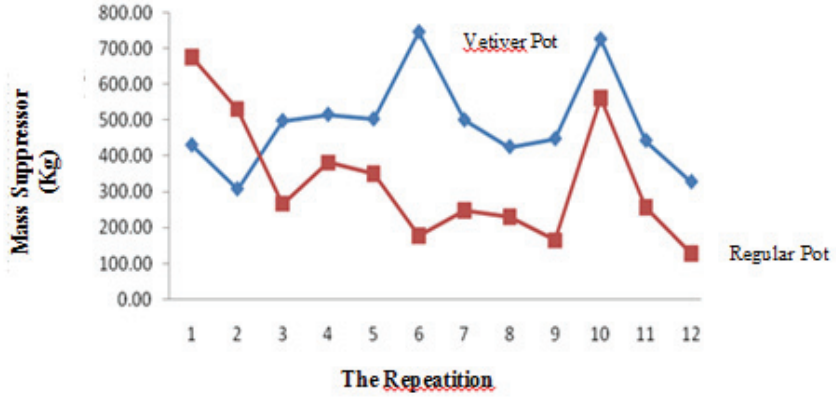


Figure 4. The Durability Comparison Curve against Discounter Mass between Vetiver Pot and Regular Pot at Emphasis on Testing in 0o position

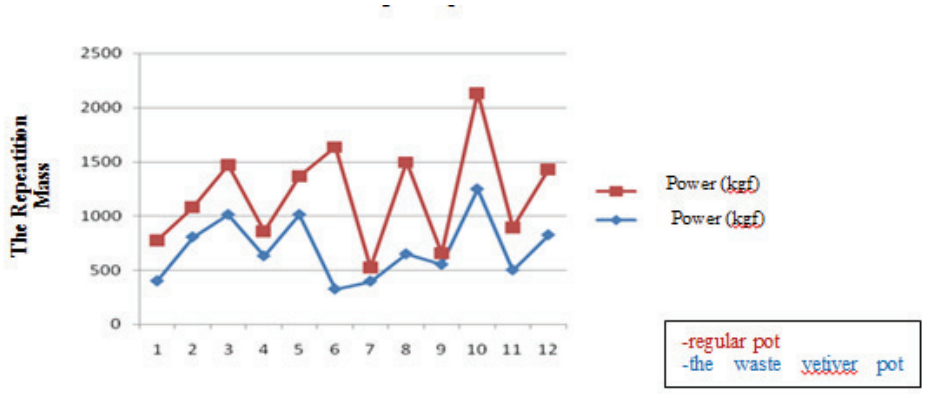


Figure 5. The Durability Comparison Curve against Discounter Mass between Vetiver Pot and Regular Pot at Emphasis on Testing in 180o position

Based on the results of power pot test generated the different crack pot. When the waste vetiver pot given maximum load, pot indirectly cracked. This is caused by the waste burnt vetiver fibers that hold pots. The fibers from waste vetiver dough stronger bond. Unlike regular pots. When the regular pot was given by the maximum load it will instantly crack pot. This is due to there are
nothing material that can resist the crack pot like waste fibers. The fibers in the waste burnt vetiver pot serves as a frame. From the data analisis can conclused that waste vetiver pot stronger than regular pot. Another advantage of pots made from waste burnt vetiver is to reduce the use of sand. The two doughs that is given the same proportion of the cement and the sand, while the other dough is added with the burnt vetiver waste that is used to make two pots whereas the dough just for one pot. In addition, the mixing of waste burnt vetiver as a pot can reduce environmental pollution.


Figure 6. Comparison of Results with Regulat Pot and The Waste Vetiver Pot

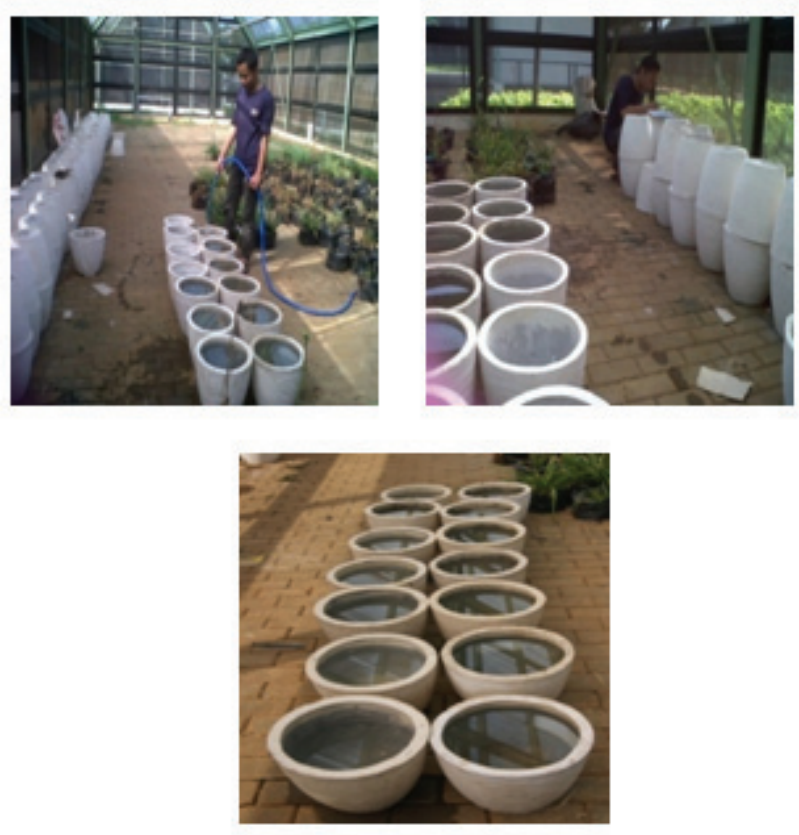

Figure 7. The Seepage Test of Waste Vetiver Pot

Measuring the diameter of pot

Measuring the mass of pot

Ssetting the machine

Figure 8. Test of Strength Vetiver Waste Pot

Figure 9. The Pot Condition After Pressing Test

## CONCLUSIONS

Manufacturing the burnt vetiver waste pot same with manufacturing the normal pot (cement pot).

The comparison of the burnt vetiver waste pot is 3:3:2, that is the burnt vetiver waste: sand : cement.

Through the seepage test result between the burnt vetiver waste with the normal pot alike can absorb the water.

The quality of the burnt vetiver waste pot has much better quality than regular pot, it is seen from the press test results of that the burnt vetiver waste pot is stronger than regular pot. Moreover, it can minimize the production cost and certainly eco-friendly.

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