Economic Review of Textile Industry and Ramie Development

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Abstract

The economic turmoils started in 1997 had affected Indonesian textile industry and the textile product industries. Many factories had sent their workers home due to their difficulty to import cotton fibre as raw material. Indonesian production of cotton is just less than 4 % of industry requirement.Textile and textile product industry had contributed to national economic considerably and employment. Most Indonesian regions are not suitable for cotton. An experiment was conducted to detect water stress in Bandung, andhad been conducted in (Bandung, Sumedang, Majalengka) 2000-2001, 2002 and 2007, the latest experiment in 2015.Response: physiological (leaf chlorophyll contents, leaf relative water content), growth and yields (number of stem, length of stem, diameter of stem, fine fibreweight,and fine fibre diameter)There were found that ramie plant is robust plant. Nitrogen and potassium are important nutrients for growth and better fibre quality. Textile industry and the product of textile industry contributed to the national revenue second only the the revenue from gas and petroleum.
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Key words : Economic, industry, ramie, textile.

1. Introduction

a. Textile Industry Development

Sastrosoeparno (2003) quoted by Subandi (2012) said that textile industry and the product of textile industry contributed to the national revenue second only the the revenue from gas and petroleum. Detail of textile and Product of Textile Export Value in 1998-2002 is presented in Tablel 1. Table 1 shows that textile and product of textile export in the period of 1998 to 2002 reached 6,8 billions dollars. In the period of January to July 2002 reached 4,07 billions, while in the period 2002 reached 4,3 billions.

Economic development is encouraged by Islam as Subandi (2012a) said that Islam is not simply a religious faith, but it is also a political, social and economic system for Islam society. That is what is intended by the phrases that describe Islam as a religion and a code of life and as a faith and sharia. Islam taught was not revealed to man for spiritual guidance only, as was other religion which advocates the principle secularism. Instead, Islam comes in order to organize

man's life in all its aspects. And further Subandi (2012b); *said Scientific theories as the product of human intelligence have changed from time to time, but scientific information in divine revelation that may appear at that time to be unreasonable, prove to be right in this time and in the long run*. And then Subandi (2012c) stated the first verses revealed to prophet Muhammad SAW is begun with the word to read. This word is an instruction to all Moslem to read in the sense of to think of the creation of the creator. Someone still has the opinion that Islam discourages the development of science. This accusation is absolutely not true.

Table 1. Value of Textile and Products of Textile Export in 1998-2002

No	Commodities	1998	1999	2000	2001	2002	Jan-Jul 2002	Jan-Jul 2003
1	Fibre	146.	97.	135.	122.	181.	333.	485.
2	Yarn	889.	1,177.	1,326.	1,243.	29.	1,136.	1,153.
3	Fabrics	1,345.	1,614.	1,913.	1,664.	1,404.	126.	130.
4	Clothes	2,405.	3,526.	4,281.	4,344.	3,805.	1,510.	1,626.
5	Other textiles	2,533.	740.	549.	304.	267.	966.	919.
	Total	7,321.	7,157.	8,204.	7,675.	6,888.	4,074.	4,316.

Source: Ministry of Trade and Industry quoted by Subandi 2012).(Unit: Million US Dollar)

Up to present Indonesia is importing cotton fibre mostly from the USA, and in return Indonesia is exporting textile and product of textile to the country. The commodities and their value of import in the years of 1998-2002 were presented in Table 2.

Table 2. Value of Textile and Product of Textile Import in 1998-2002

No	Commodities	1998	1999	2000	2001	2 002
1	Fibre	988.690	833.647	1,009.517	1,336.115	921.617
	Silk	0.308	0.765	1.008	0.429	0.411
	Other nat.fib.	782.157	681.445	739.459	1,076.687	720.076
	Synthetic	206.224	151.436	269.050	258.999	201.128
2	yarn	220.956	195.289	276.246	261.348	220.398
3	clothes	746.010	631.057	926.411	753.265	588.649
4	fabrics	5.019	8.179	10.390	17.561	27.635
5	other textiles	59.830	47.453	61.581	72.824	69.937

Source: Ministry of Trade and Industry, quoted by Subandi 2012).(Unit: Million US.Dollar)

The important of textile industry for Indonesian economic is apparent and affectsmany people.According to Textile World Asia (2013) andIndonesian textile and apparel community information source, the textile and apparel sector consisted of 2,994 enterprises in 2012. The majority of those companies are located in the region of Java (West Java). As the largest employer in Indonesia's industrial and manufacturing sector. The textile and apparel industry in 2012 employed approximately 1.5 million workers. As a matter of facts many people of both better and less educated are provided employment in this textile industry sector, and the majority of textile and garment industry workers are women. This social-economical characteristic of industry contributes special impact to prosperity development of nation.

Thomasson (2013) reported that The German Engineering Federation (VDMA)Textile Machinery Association reports that German exports of textile machinery and accessories to Indonesia increased significantly in 2012 over 2011. In 2012, German finishing machinery exports to Indonesia increased 747 percent over 2011 exports to total 34.2 million Euros in value; knitting and hosiery machinery exports increased 88 percent to total 14.7 million Euros; spinning machinery exports increased 83 percent to total 67.5 million Euros; and weaving machinery exports increased 55 percent to total 4.6 million Euros.

Table 3 shows output and value of export output Garments, Leather Product and Footwear in Indonesia from 2010 up to 2013. And Table 4 shows the development of textile factory to replace the old machinery with the new equipment and accessories indicating there is a progress in textile industry in this country.

Tabel 3. : Output Garments, Leather Product and Footwear in Indonesia

	2010	2011	2012	2013
National output (trillion IDR)	124.204	243.385	156.634	172.423
Year-on-year Output Growrh (real)	1.77 %	7.52 %	4.27%	6.06 %
Export (billion USD)	10.692	13.013	12.815	13.175

Sources: Central Bureau of Statistics(2014)

Indonesian textile industry in 2011 and 2012 has imported textile machinery as illustrated in Table 4. The Table indicates a considerable development in textile industry occurred in this country.

Table 4.Importof Indonesia or and Shipment of Textile Machinery to Indonesia

No		2011 Value	2012 Value
1.	Short- Staple Spindles	516.888	594.288
2	Open-end Rotors	4.900	400
3	False-twist spindles	4.144	5.040
4	Double heaters	4.144	5.040
5	Shuttleless looms	2.909	3.7.27
6	Rapiers/Projectile	1.258	1.469
7	Air-jet	1.244	1.485
8	Water jet	407	733
9	Flat Knitting Machinery	625	1.670
10.	Hand knitting semi automatic	254	1.147
11	Flatbed electronic	371	523
12	Circular knitting machinery, large(>165 mm)	658	1.343
13	With jacquard electronic	6	23
	Woven finishing machinery	7	9
14	Knit finishing machinery	2	8

Source: Textile World Asia (2013).

. API (Indonesia Association of Textile Producers) has high hopes for the industry's 2013 performance. The organization has predicted that Indonesian textile exports will rise by more than 6 percent this year to US$13.4 billion. API expects this increase will be prompted mainly by an increase in demand from the U.S. and Japan. For example, textile exports to the U.S. are expected to increase 4 percent, from US$5 billion in 2012 to US$5.2 billion in 2013. In addition, API notes that exports to Japan in the first 11 months of 2012 rose 16.3 percent to US$1.05 billion. API also points out that Indonesian textile exports to Japan have increased 70 percent since the Japan-Indonesia Economic Partnership Agreement was implemented in 2008. (Textile World Asia. 2013).

b. Development of Ramie Cultivation

Agriculture and fisheries are highly dependent on specific climate conditions. Trying to understand the overall effect of climate change can be difficult (EPA, 2013). Global climatic

change has been influencing all aspect of agricultural activities. Farmers in Indonesia (tropical region) are difficult to make their cultivation plan. There is no more distinctive change of environmental and agroclimatic conditions throughout the months of the year. ChengjianHuang,et al. (2013) reported that it might be due to rainfall pattern shift as a result of global climate change, causing worse drought coming along with high temperature in Yangtze river basin. This climate phenomenon cannot be easily detected or explained by the average data of annual precipitation

. Ramie need much water supply and is sensitive to water shortage. Ramie plant is ready to be harvested in the age of 60 days after planting. Ramie plant requires humid soil but not saturated for good yield, but ramie is planted in rain fed land. Unlike the dry-land sugarcane cultivation practice which is supplied with additional irrigation water in time of rainfall is lack within certain period. And scheduled the harvest of ramie less than 60 day after the previous harvest.Ramie is easy plant to grow, once it grew, its rhizomes established in the soil. It will grow for years as it belongs to perennial plant. Established root system of ramie can completely suppress the weed growth. and ramie needs low cost of cultivation. This economical agronomy characteristic give beneficial prospective for relieving the burden national budget in import spending for cotton fiber as the case of Indonesia or other non-cotton producing countries (Subandi 2014)

Ramie plant grows well in humid and warm tropical region, subtropical and temperate zones and in the winter temperature does not drop below frozen level (Ditjenbun,1997),and Dempsey (1963) stated the optimum temperature for the good growth of ramie planted in subtropic region were between 20 ^{0}C and 24 ^{0}C, while the temperature for ramie plant growing in tropical region were 24 ^{0}C and 28 ^{0}C. CaiTiangchan and Luo Ling (1989) reportedthe goodtemperature for rami growth were 23.0 ^{0}C and 29.7 ^{0}C, and lower temperature was 9.0^{0}C. Petruszka (1977) reported ramie could resist well in the winter low temperature-such as the minimum temperature below 9. 0^0 C. this happened because of the protection of rootstocks by a layer of dead leaves. And it is said in the tropical regions, a good yield harvested in plantation at the elevation 1300 m above sea level, and rainfall ranging from 140 mm to 360 per month with even distribution through the months and the year.

As the nature and characteristic of organic manure, sheep dung beside as nutrition it function to stabilize the soil structure and moisture and enhance the life of microorganisms. Zhou Zhaode, et.al,1989 quoted by Subandi (2012) said phosphorus is not so important for ramie, while potassium affects quality and quantity of fiber. Potassium is considered as the second most important nutrients for ramie plant. Wan Qiang,et.al (1989) reported that the effect of potash nutrient is to give agood effect on the quality of fibre, and potash effect to counter the negative effect of nitrogen.

Area and ramie production by farming category (smallholder) in Indonesia in the years 2001-2014 are showed in Table 5.

Table 5. Area and Ramie Production in Indonesia

Year	Area smallholder (ha)	Production /China grass (ton)	Notes
2001	384	57	
2002	309	375	
2003	113	-	Unrecorded
2004	142	14	
2005	142	14	
2006	-	-	Unrecorded
2007	12	-	Unrecorded
2008	56	36	
2009	76	38	
2010	43	12	
2011	2.938	4.548	
2012	528	169	
2013	279	161	
2014	280	163	

Source :Central Bureau of Statistics (2014)

Indonesia Export and import of ramie fibre in the year of 2010 to 2012 are presented in Table 6.

Table 6. Export-Import Value and Valume of Ramie in 20010-2012

Year	Export		Import	
	Volume (ton)	Value (US$ 000)	Volume (ton)	Value (US$ 000)
2010	34	9	2	1
2011	-	-	-	-
2012	2.990	1.036	53	73

Source :Central Bureau of Statistics (2013)

The content of Table 6 gives the illustration that the policy of Indonesia government was unconfirmed in the cultivation of ramie as raw material for textile industry. Once the government promote the production of the natural rubber suitable in Indonesian climate condition (ramie plant), but however government gave no agricultural incentive and protection to the farmers. And government built no facilities for processing factory for ramie fiber. This is a political will matter. This cases make the unstable acreage and production of ramie plantation for years as indicated in the Table 5.

2. METHODOLOGY

Data of textile and product of textile industries were compiled from the archives of Bureau Statistics of Indonesia and other sources and references. Experiment inDistricts of Sumedang (Jatinangor) and Majalengka (jatitujuh) district was conducted in 2000-2001, and in Sub-district of Tanjungsari in 2007, and the latest experiment is in Bandung district inNovember, December 2014, and January 2015. (thethirthratoon plant) Jatinangor, Sumedang district lies on the elevation of 750 m above sea level (ASL), belongs to C rainfall type, 5 to 6 wet-months and 2 to 4 dry months (slightly wet) based on Schmidt and Ferguson (1951). Soil ordoInceptisol, subordotropeptl and subgroup Fluventik, Eutropepts, isohipertermik.

3. Result and Discussion

Textile industry and the product of textile industry contributed to the national revenue second only the the revenue from gas and petroleum. The economic turmoils started in 1997 had affected Indonesian textile industry and the textile product industries. Many factories had sent their workers home due to their difficulty to import cotton fibre as raw material. Indonesian

production of cotton is just less than 4 % of industry requirement.Textile and textile product industry had contributed to national economic considerably and employment.

Textile industry for Indonesian economic is apparent and affectsmany people.According to Textile World Asia (2013) andIndonesian textile and apparel community information source, the textile and apparel sector consisted of 2,994 enterprises in 2012. The majority of those companies are located in the region of Java (West Java). As the largest employer in Indonesia's industrial and manufacturing sector. The textile and apparel industry in 2012 employed approximately 1.5 million workers. As a matter of facts many people of both better and less educated are provided employment in this textile industry sector, and the majority of textile and garment industry workers are women. This social-economical characteristic of industry contributes special impact to prosperity development of nation.

Experiment in 2014-2015 conducted inBandung District.

-Physiological Plant Responses

a. Leaf Relative Water Content

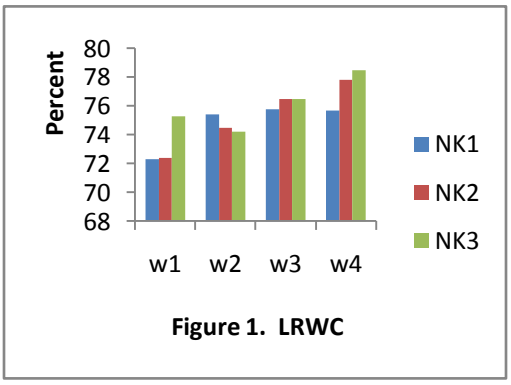

Figure 1. LRWC

Figure 1 shows the Leaf Relative Water Content (LRWC)of ramie plant. Experiment in Bandung showed the Leaf Relative Water Content (LRWC) of Leaf measured yielding data and then analyzed showed the effect of water and fertilizer treatments on relative water content of plant as differ significantly. The more water and fertilizer applied the more LRWC. Figure shows the effect of water dosages at levels of fertilizers as different. Plant water status as response to the water and fertilizer.

Plant absorbs nutrition (nitrogen and potassium) in the presence of water as solvent. Chengjian Huang et al.(2013) stated LRWC representing the plant water status , reflecting the metabolic activity in tissue. Sartajet. al.(2013) said LRWC is usually used as one of the most meaningful indexes for dehydration tolerance in wide variety of plant. In the first ramie plant generation the effect of less water supply is not yet causing problem in plant metabolism. The cutting as source of growing energy was still supplying sufficiently for germination and further

first growth. But it is apparent the trend is becoming that the different dosages of water and fertilizer will result in different response of ramie plant. It is apparent in the extrapolation of the curves in the Figure 1, there will be an increase of the effect of more water and more fertilizer.

a. Fine Fibre Weight

Esau (1984) said that ramie fiber is extraxiler that is fibre existing outside the xylem tissue. And Fahn(1992) said that ramie fiber develop in secondary phloem tissue. Curves of Figure 4 show the increase of fibre in line with the increase of water supply and application of fertilizer.

Balittas (2014) stated that the fiber production of Ramindo 1 (formerly the Pujon 10 cultivar) per stem is 4-5 gram, while the experiment showed at the dosages w1 and w2 at all levels of fertilizer produced below the 1.5 gram (Figure 4). It means the stress of water made plant difficult to develop its tissue, and w_3 shows a more efficient rate.

b. Fiber Diameter

Diameter of fine fibre showing the pattern of increase in line with the increase of fertilizer application and water supply (Figure 5). The more apply of fertilizer and more water supply the bigger diameter are. Bigger diameter is the representative of better vegetative growth as the result of better soil fertility and water supply. Ditjenbun (1997) stated that diameter of ramie fiber may be between 13µ up to 126µ and the mostly found between 40µ to 60 µ (Ditjenbun,1997).

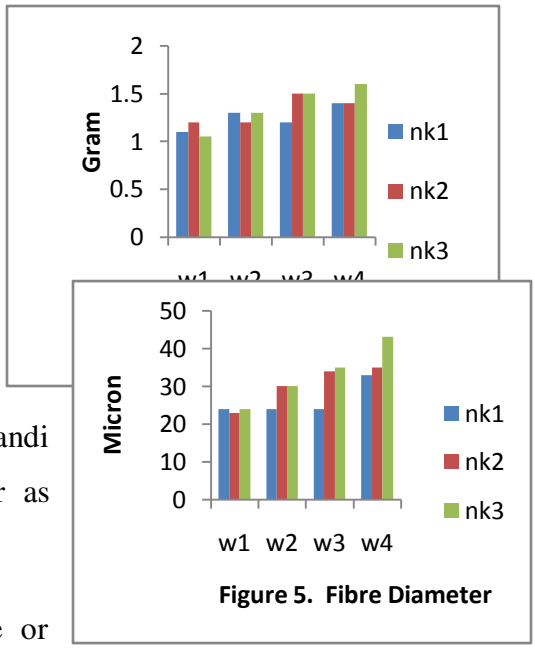

Figure 5. Fibre Diameter

Measurement of fibre diameter was done with Optilab equipped to binocular microscope. Subandi (2014) reported images of ramie fibre diameter as figures below (Figures.6,7,8, and 9)

Diameter representing the fineness of fibre or quality, the smaller the diameter the finer the fibre is. Finer fiber is wanted by the producer of textile. Subandi (2002) found ramie planted in dryer region will have finer fiber. Plant suffered with lack of water limited in developing its tissue. Ramie grows in more fertile soil with

sufficient water develop its tissues better, and the more fertile soil and the more water available affect plant to grow rigorously and develop better vegetative organs with bigger cells and tissues. Fiber is vegetative tissue, so supplying more water and fertilizer yield the worse dimension of fiber in respect of quality as is shown in the Figure 5 indicating the increase of the diameter in line with the increase of dosages of water supply.

Subandi and Abdelwahab (2014) found ramie plant grows in more fertile soil with sufficient water develop its tissue normally, and more fertile soil and more water available affect plant to grow rigorously and develop good vegetative organs with bigger cells and tissues. Fiber is vegetative tissue, so supplying more water and fertilizer yield worsen dimension of fiber in respect of quality

Table 9. Degum Fibre Weight at Jatinangor Experimental Field (Ramie applied with Nitrogen, Potassium and Sheep Dung Organic Manure)

N (kg ha^{-1})	K (kg ha^{-1})	Sheep Dung (D) (t ha^{-1})					
		0	5	10	15	20	Average
		---------- g plot^{-1} ----------					
15	15	56.95	63.09	70.03	73.99	82.55	69.44 a
	30	61.23	63.67	78.05	72.95	83.97	71.37 a
Average	45	67.28	75.79	83.76	98.28	95.89	84.20 b
		75.00 P					
	15	61.49	71.69	75.65	81.10	86.39	75.26 x
30	30	57.81	76.59	85.79	82.33	87.11	77.93 x
	45	83.68	87.40	88.51	89.73	98.66	89.59 y
Average		80.93PQ					
	15	66.95	78.21	82.15	84.99	85.43	79.55 k
45	30	82.30	81.64	82.99	92.79	84.55	79.86 k
	45	74.45	93.50	88.06	93.54	113.47	92.60 l
Average		83.66 Q					
	Average	65.79	76.91	81.65	84.41	90.56	
		A	B	BC	BC	C	

Notes: Analysis of Variance : D, N, and K were significantly different. Figures followed with the same italic vertical, and capital horizontal/ vertical were not significant different based on LSD at 05.

Table 10. DegummedFibre Weight at Jatitujuh Experimental Field (Ramie applied with

Nitrogen, Potassium and Sheep Dung Organic Manure)

N (kg ha^{-1})	K (kg ha^{-1})	Sheep Dung (D) (t ha^{-1})				
		0	5	10	15	20
		---------- g plot^{-1} ----------				
15	15	35.51	40.12	45.26	43.25	47.69
	30	36.25	42.63	46.38	44.58	48.05
	45	36.45	42.86	47.58	45.56	49.08
30	15	38.28	33.69	48.25	48.67	49.67
	30	39.56	35.89	48.90	49.45	50.76
	45	40.09	35.87	50.54	50.85	51.23
45	15	38.56	38,67	48.64	50.25	50.76
	30	41.23	39.79	49.50	51.25	50.85
	45	41.27	40.60	51.20	51.58	50.10

Notes: Analysis of Variance : D, N, and K were not significantly different.

Table 9 and Table 10 show the results of effect of sheep dung, nitrogen and potash fertilizers on the yield of ramie fibre. Application of D, N, and K were significant different effect on the yield in Jatinangor with more moist environment (local climate), and were not significant different in Jatitujuh with dryer environment. These different environmental condition effect the yield, figures degummed fibre weight in Table 9 and 10 show different dimension. More moist means more water supply yielded more weight of degummed fibre. This was the proofthat plant grew better in moist environment. And Table 9 shows that more supply of fertilizer resulted in more yield, this was also the proof that ramie requires certain degree of soil fertility. The plant need organic manure and requires nitrogen for vegetative and potash for maintaining good diameter of fiber.

The effort to increase the production of raw material for clothing is important to make the life is perfect and welfare. This study is encouraged by the teaching of Islam, biology studies must be conducted to achieve the capability as said by Subandi (2005) and technology to cultivate the estate crops in of very valuable for Indonesia (Subandi, 2011)

4. Conclusion

Textile industry contributed considerable economic utilities, and provided employment for both thebetter educated and the less educated people and the majority of textile and product of textile worker are women.This has a strategic for Indonesia national prosperity development. To supply of raw materian for textile is required to be increased through cultivation of alternative cotton that the ramie.

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