

## INVIGORATING BIOCOMPOSITE SECTOR THROUGH USING OIL PALM AND KENAF BIOMASS TO ELEVATE THE TIMBER SUPPLY CRISIS IN MALAYSIA

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The biocomposite industry in Malaysia has shown tremendous transformation since its introduction early 1990's. With the issue of depleting timber supply, the biocomposite sector seems to be the preferred alternative solution to elevate the timber shortage issue. Since biocomposite industry requires not only timber as its raw material, other commodities such as Oil Palm and Kenaf have also been considered as alternatives for reliable raw material sources. On this note, it is important to encourage the biocomposite industry to use both crops as the main raw materials. The issues of shortage of timber supply could thus be significantly minimized while contributing to the national wealth.

### Oil Palm residue as new fibre sources

The Malaysian oil palm industry produces 11.9 million tones of oil along with a staggering amount of oil palm biomass of about 90 million tones. From that volume, 40 million tones are in the form of oil palm fronds (OPF), empty fruit bunches (EFB) and oil palm trunk (OPT) while the remaining 50 million tonnes were from palm oil mill effluent (POME), stems, shells and roots (Anis et al. 2003). Over 90% of EFB can be converted into fibre material compared with 25% and 50% respectively from OPT and OPF (Thole and Hora, 2003). The abundantly available EFB has opened a wider potential of fibre source for the biocomposite industry in Malaysia. This was clearly indicated by Kamaruddin et al. (1997), that the supply of oil palm residues, including trunk, fronds and EFB were expected to increase exponentially until the year 2020. EFB offers the best potential for raw materials by in lieu of its low production cost and availability. This would be more than sufficient in sustaining the supply of wood-based industry. Although the EFB fibre is considered inferior in quality to that of trunk and frond, pre treatment could enhance its properties to the required standards.

Many studies have been done to investigate potential use of oil palm biomass as material for manufacturing of biocomposites products. A number of biocomposite products have shown bright prospects to be commercially produced using oil palm biomass such as plywood, medium density fibreboard (MDF), particleboard and fibre-reinforced plastic composites (FRPC). As mentioned by Anis et al., (2007), if all the available biomass is fully exploited, the oil palm industry has the potential to develop into RM20 billion a year.

### Kenaf as new alternative crop for fibre source

One of the setbacks in forest management practice in Malaysia is the long rotation period. For instance, Sarawak is managing the forests following a selection system under the "sustained yield" concept that requires harvesting on rotational basis of 25-year cycles. Based on the types of forest, the cutting cycle varies, e.g., for Dipterocarp Forest, it is 30-55 years, for Peat Swamp Forest, it is 40-60 years, and for Mangrove Forest, the cycle is 20-30 years. In contrast, kenaf can be harvested between four or five months after planting. It can grow 3 to 5 times faster than poplar, and up to 3 times faster than reed and bamboo. Kenaf production yields are favorable when compared to wood. An average of 17.8 tonne per hectare (ha) per annum (a) can be achieved with kenaf, compared to 2.2 tonne/ha/a for tree fibre. Over the period 1997 – 2001, the global average for yield of kenaf is about 1.2 tonnes dry fibre/ha. Average yields obtained by different countries are: Indonesia 1.4tonne/ha, Thailand 1.6tonne/ha and India 1.7tonne/ha. The potential yield of kenaf as obtained in experimental fields with improved cultivars, is 3-5 tonnes dry fibre/ha. Seed yields of 1-1.5tonne/ha can be obtained from late-sown kenaf plots. The experimental plots at the National Kenaf and Tobacco Board (NKTB) have shown that to be economical, the yield of kenaf stem (moisture content 15-20%) should reach 15-20tonne/ha. Due to the limited wood resources available, kenaf plants have the potential to make a significant contribution to the supply of raw material for





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biocomposite sectors in Malaysia.

### Efforts on promoting Oil Palm and Kenaf as major fibre sources for biocomposite and wood-based industries in Malaysia

The utilization of oil palm biomass as fibre sources for industry need no further introduction since continuous effort has been made for more than 20 years. The Malaysian Palm Oil Board (MPOB) is the lead agency appointed by the government to support the well being of the oil palm industry in Malaysia. In contrast kenaf is a newly introduced crop in the national agenda under the Ninth Malaysian Plan which commenced in 2006. The National Kenaf and Tobacco Board (formerly known as National Tobacco Board) was appointed as lead agency. Together with MARDI and UPM, among the pioneer agencies with experience in Kenaf R&D, the implementation of Kenaf agenda is designed to be integrated effort involving related agencies from the government and industry sectors. The development of kenaf industry in the country will focus on the primary objective to promote it as an economically attractive new industrial crop for farmers, particularly smallholders. Being a fast growing crop, kenaf has great potential as Malaysia's future industrial crop which can help in uplifting rural income. Recognizing the potential, the Government allocated RM2 million for kenaf research under the Seventh Malaysia Plan (1996-2000) and another RM3.2 million for the same purpose under the Eight Malaysia Plan (2001-2005). The effort was intensified in the Ninth Malaysian Plan (2006-2010) as reflected by another RM20 million being approved for top-down kenaf R&D in upstream (planting and agronomy), downstream (processing and product development) and marketing activities. Since the year 2000, the Malaysian Government has allocated RM48.8 million (USD15.25 million) to accelerate kenaf-based activities, both in upstream and downstream sectors. In the initial stage, 450ha of land had been planted with kenaf, yielding 10-

15 tonnes fibre/ha (two crops a year) in a joint project between Matsushita Electric Works and Mieco Chipboard in Kuantan for the production of kenaf oriented boards for flooring. Currently, the NKTB has allocated 1,250ha of land to be planted with kenaf.

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