

EL NIÑO, FERTILIZER APPLICATION, AND COCOA YIELD IN SULAWESI, INDONESIA

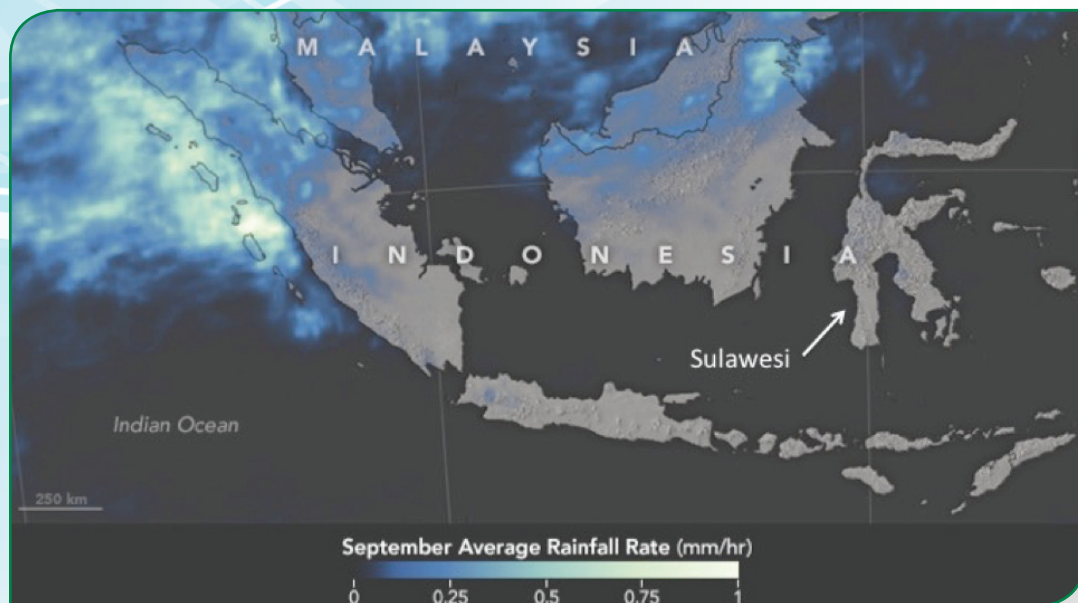


Figure 1. Satellite observations of rainfall over Indonesia, captured by the Global Precipitation Measurement (GPM) mission for September 2015. (Source: Joshua Stevens, Jesse Allen, NASA Earth Observatory, Precipitation Processing System of GPM's Science Team, accessed in September 2016 at <http://power.larc.nasa.gov/cgi-bin/cgiwrap/solar/agro.cgi>.)

In 2015, an unusually strong El Niño had been brewing in the Pacific Ocean. Fishermen of Northern Peru used the term to describe a warm southward coastal current that occasionally develops around December. Now meteorologists use the term to describe large increases in sea surface temperatures in the eastern and central equatorial Pacific that occur at irregular intervals.

In El Niño years, parts of Indonesia experience drought, just like in 2015. The map (Figure 1) indicates the areas that received the most rainfall in September 2015 with white colors, low rainfall is indicated by blue areas, while no rain is shown in gray. Sulawesi is almost entirely gray. Similarly, the Prediction of Worldwide Energy Resource website indicated a much lower cumulative rainfall in 2015 (1,350 mm) than in 2014 (1,656 mm) (NASA, 2016) for the Soppeng area of Sulawesi.

Since 2012, IPNI and Cocoa Care engaged with Indonesian smallholder farmers to understand the impact of good agricultural

practices and complementary 4R nutrition on cocoa bean yields. One group of 16 farmers collaborated with IPNI and Cocoa Care during 2014 and 2015.

Farms were divided in two equal sized parts. In one half, good agricultural practices without additional fertilizer nutrients (GAP) were implemented, while GAP with 4R-consistent nutrient management (GAPN) was imposed in the other half. GAP involved regular pruning, weeding, and phytosanitation. In 4R Nutrient Stewardship, the right source of fertilizer is used, at the right rate, time, and place.

Our fertilizer recommendation was developed based on the replacement of nutrients exported by a target yield of 2 t/ha. Inorganic fertilizer nutrients were selected because compost sources are limited. The fertilizers were applied twice a year with the onset of the rainy season (December/January and July/August). Nutrients were buried in four 20 cm deep holes with 10 cm diameter, equally spaced around the tree and along the edge of the canopy to match root growth.



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“The fields that were only managed with good agricultural practices (GAP) had a 23% yield reduction in [drought conditions], while yields in farms receiving GAP and complementary nutrition only dropped by 12%.”

Table 1 shows the average dry cocoa bean yields for the two groups. As expected, GAPN performed better than GAP in both years. In 2014, the complementary fertilizer application translated into 230 kg of extra beans per ha, about 25% higher than GAP only. In 2015, this difference was more than 280 kg/ha, or 34% more yield in GAPN.

The comparison across the two years indicated the influence that El Niño had on the yield. The fields that were only managed with good agricultural practices had a 23% yield reduction in 2015, while yields in those farms that received GAP and complementary nutrition only dropped by 12%. These results underscore the role adequate and balanced nutrition plays in water stressed conditions.

TABLE 1: Group average dry cocoa bean yields for a group of 16 farmers who worked with the IPNI Cocoa Care project in 2014 and 2015 in the Soppeng area of Sulawesi, Indonesia.

	GAP	GAPN	Difference, kg/ha	Difference, %
2014	696 kg/ha	928 kg/ha	232	25
2015	533 kg/ha	817 kg/ha	284	35
Difference, kg/ha	-163	-111		
Difference, %	23	12		

Yields are given for good agricultural practices without additional fertilizer nutrients (GAP), and GAP with 4R-consistent nutrient management (GAPN).

IPNI Southeast Asia Program - Information Services

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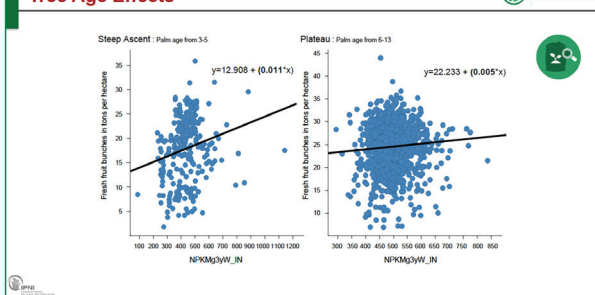
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DA BAR Launching of Nutrient Expert for Maize



3

Tree Age Effects



1. Library – contains lists of new entries to the IPNI SEAP library; updated every quarter.

2. Videos – review all our webinars online, or catchup on others that you may have missed. Crops range from oil palm, cassava, cocoa, to maize.

3. Presentations – showcases key talks on topics presented at various conferences and seminars by the IPNI SEAP team.