**Soil suitability map for teak plantation in the Northeast of Thailand**

Teak (*Tectona grandis*) is a valuable indigenous tree species in Thailand. Teak wood products are used in making high quality furniture and as building material for houses, etc. It is one of several economic tree species suitable for farm forestry management, and plays a vital role in promoting forest restoration and regional development, thanks to rapid tree growth and high timber prices. Teak has several characteristics, including affinity to specific soil types and conditions, hence future yield depends on site suitability for teak plantation.

Decision support information on determining site suitability is important to teak farmers. There had been no such maps that quantitatively showed soil suitability for teak plantation; thus, not a few farmers came to grief after realizing that they had planted on unsuitable sites.

In general, the northeast region of Thailand is not suitable for teak growing; however, we have observed some promising areas. Thus, we endeavored to produce soil suitability maps for Udon Thani and Nong Bua Lam Phu Provinces in order to promote teak farm forestry for livelihood improvement. Based on field surveys and the soil group map of Thailand created by the Land Development Department, the soil suitability class (SSC) for teak plantation in the two provinces was developed. The SSC was categorized into 5 ranks, ranging from 1 (good) to 5 (poor). Letter suffixes were appended to SSC ranks 2-5 to denote site limitations (i.e., n: nutrition, f: flooding, g: gravel, d: drainage). The areas of slope complex (SC) and water (W) on the soil group map were not classified. The SSC is equivalent to the site quality class shown in 'Yield table for Teak plantation in the Northeast of Thailand' (Fig. 1R). The future yield of a teak forest stand can then be projected by combining data from the soil suitability map and the yield table (Figs. 2 and 3).

Matching accuracy is about 69%; however, actual teak growth might be different from the SSC because of the effects of maintenance (Sukchan and Noda, 2012). The map shows the landmarks (in Thai) and includes photographs of typical soils by SSC to provide guidance to farmers and Royal Forest Department (RFD) extension staffs (Fig. 2). Currently, the soil suitability map covers only Udon Thani and Nong Bua Lam Phu Provinces, but this know-how will be made available so that the map extends to other provinces.

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Fig. 1. Left: Soil suitability map for teak plantation in Udon Thani and Nong Bua Lam Phu Provinces (Noda et al., 2012); Right: Yield table for teak plantation in the Northeast of Thailand (Vacharangkura et al., 2011)

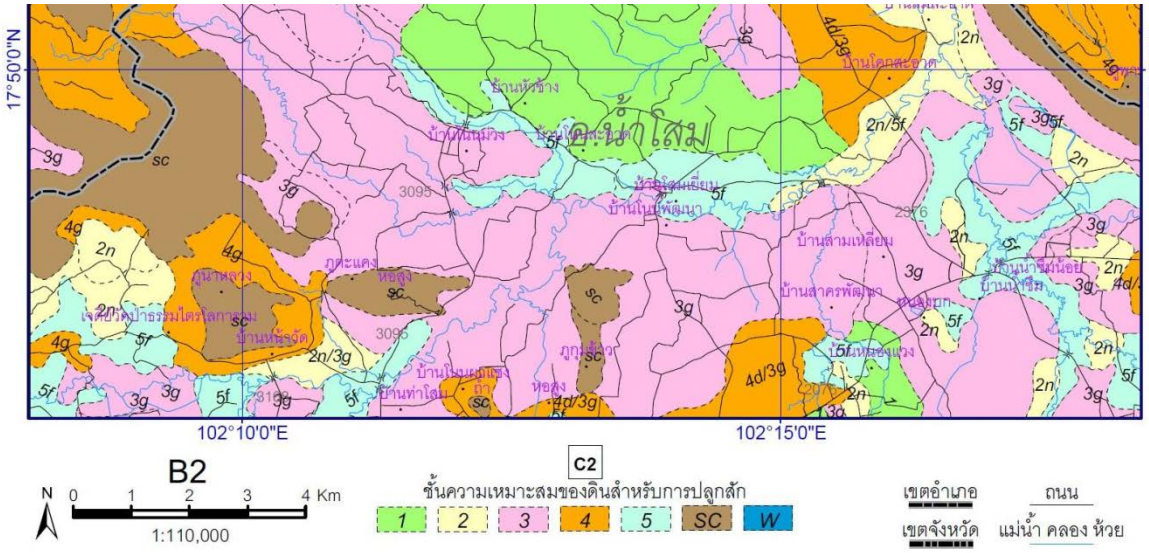


Fig. 2. Soil suitability map (sample page, in Thai). Legend on the map means that SSC 1: green colored area, SSC 2: cream colored area and so on. Also, dashed line: district boundary; dashed-two dotted line: province boundary; solid black line: road; solid blue line: channel or river.

| ระยะปลูก 4 ม. X 4 ม. ชั้นคุณภาพพื้นที่ระดับดี (SI = 26) | | | | | | |
|---|---|---|---|---|---|---|
| อายุ (ปี) | ความสูงไม้เด่น (ม.) | ความสูงเฉลี่ย (ม.) | ความโตเฉลี่ย (ซม) | พื้นที่หน้าตัด ($ม.^2$/ไร่) | ปริมาตรต่อต้น ($ม.^3$/ต้น) | ปริมาตร ($ม.^3$/ไร่) |
| ... | ... | ... | ... | ... | ... | ... |
| 14 | 18.7 | 15.7 | 59.2 | 2.035 | 0.253 | 17.341 |
| 15 | 19.2 | 16.2 | 61.6 | 2.134 | 0.279 | 18.522 |
| 16 | 19.8 | 16.8 | 64.0 | 2.230 | 0.305 | 19.698 |
| ... | ... | ... | ... | ... | ... | ... |

Fig. 3. Yield table (sample page, in Thai). Case scenario: A teak plantation spaced at 4m x 4m, with site index (SI) = 26 and SSC rank = 2. The teak plantation is projected at age 15 to have a dominant tree height of 19.2 m, an average tree height of 16.2 m, an average tree girth of 61.6 cm at breast height, a basal area of 2.134 $m^2$/rai, a stem volume of 0.279 $m^3$/tree and a stand volume of 18.522 $m^3$/rai. ( 1 rai = 0.16 ha )

References

1*) Noda I., et al. (2012) Soil suitability map for teak plantation in Udon Thani and Nong Bua Lam Phu Provinces. 70pp, RFD-JIRCAS Project. (in Thai)

2) Sukchan S. and Noda I. (2012) Improvement of soil suitability mapping for teak plantations in Northeast Thailand. JIRCAS Working Report 74: 27-32.

3*) Vacharangkura T., et al. (2011) Yield table for Teak plantation in the Northeast of Thailand. 54pp, RFD-JIRCAS Project. (in Thai)

(*) http://forprod.forest.go.th/forprod/ebook/e-book.html