ABSTRACT

Title : Study on the botany and optimum growth stage of indigo for natural dye-making

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These experiments were conducted at Chiangmai Field Crops Research Center, Chiangmai in 1994-1996. They were proposed to study the botany and physiology of indigo (*Indigofera tinctoria* Linn.) and to find out an appropriate growth stage of indigo for natural colour extraction.

A study on the botany of indigo was observed in 7 indigo lines, i.e. CMIGC 94001-1, CMIGC 94001-2, CMIGC 94001-3, CMIGC 95001, CMIGC 95002, CMIGC 95003 and CMIGC 95004. It was concluded that indigo is a dicotyledon and semi–indeterminate plant, has a well-developed taproot, and a branched root. The stem colour is green at vegetative growth stage, and changes to greenish-yellow when it turns to reproductive growth stage, and finally changes to yellow–brown and dark–brown at maturity. Branches and flower bud are initiated on the nodes. Indigo leaf is a compound leaf which consists of 3 - 19 leaflets, being its varietal characteristic. Leaves are arranged in opposite, but the last leaf is single and initiated at the top of the petiole. Generally, indigo leaves are entire, rounded, and pinnately compound leaves in shape. The upper side of the leaf is more dark-green than the other side. Raceme initiation occurs on nodes of the main stem or branches. Flower has 4 petals, 10 stamens and 1 stigma. The colours of corolla are varied depending on varieties. It can be found in white, dark–pink, purple–pink or purple. The flowers take 61.00, 75.87 and 92.07 days to open, and the opening

starts from the lower flower to the top of the raceme. Pod is developed within 3 - 4 day after flower opening. It is rounded or rectangular in cross section depending on varieties. It can be linear or curved in shape. Pod is about 2.32 millimeters. in diameter and 4.67 centimeters in length. Maturity is found first on the lower pods. Indigo seed colour is yellow–green and rounded in shape. The seed size is quite small, with the 1,000 seed weights of between 3.35-16.14 gram depending on varieties.

The second experiment was carried out to study physiology and agricultural characteristics of indigo. In late rainy season, 3 indigo lines i.e. CMIGC 94001-1, CMIGC 94001-2 and CMIGC 94001- 3 were studies for plant height, number of leaves, number of nodes/plant, number of branches/plant and root length. It was found that there was not a significant difference at 180 DAS (day after sowing) among the 3 lines. They were 161 centimeters in height and had 3 - 19 leaves. The stem had 45 nodes and 15 branches. These 3 lines were 35 centimeters in length.

In early rainy season, other 4 lines i.e. CMIGC 95001, CMIGC 95002, CMIGC 95003 and CMIGC 95004, were added into the experiment to be observed on the same characteristics as in late rainy season. The results showed that there was a significant difference between lines in 180 days CMIGC 94001-1 , CMIGC 94002-2 and CMIGC 94001-3 at 127 centimeters in height while CMIGC 95001 , CMIGC 95002 , and CMIGC 95003 at only 77 centimeters in height, but CMIGC 95004 was significantly highest (155 centimeters). All lines had similar number of leaves (3-15) and 54 nodes/plant whereas CMIGC 95001 , CMIGC 95002 and CMIGC 95003 had only 29 nodes/plant and CMIGC 95004 had 45 nodes/plant. The 7 lines were not significantly different in number of 10 branches/plant.

The last experiment was conducted to find out an appropriate growth stage of 3 indigo lines for natural colour extraction from their leaves and petioles. It was found that the 3lines were not significantly different in their colour concentrations. However the results showed that leaves and petioles of 3 months after sowing indigo gave the highest concentration of colour

and 5 months after sowing indigo gave only 1.50, 1.26 and 1.21 ppm of colour concentration respectively.