

Pokchut Kusolkumbot 2012: Variety Improvement in *Jatropha curcas* L. by Interspecific Hybridization. Master of Science (Genetics), Major Field: Genetics, Department of Genetics. Thesis Advisor: Assistant Professor Vipa Hongtrakul, Ph.D. 105 pages.

Variety improvement in *Jatropha curcas* L. by interspecific hybridization was performed between plants in the genus *Jatropha* available in Thailand, which were *J. curcas* L., *J. gossypifolia* L., *J. multifida* L., *J. podagrica* Hook. and *J. integerrima* Jacq. Direct and reciprocal crosses between *J. curcas* L. and the other *Jatropha* plants were conducted and the derived F₁ hybrids were then confirmed using 20 hybrid detecting primer pairs. Twelve F₁ hybrids were obtained; 8 hybrids from *J. curcas* - *J. integerrima* crossing, 2 hybrids from *J. curcas* - *J. multifida* crossing and 2 hybrids from *J. curcas* - *J. podagrica* crossing. All the confirmed hybrids had morphological characters between their parents. Hybrids from *J. curcas* L. and *J. integerrima* Jacq. continuously produced flowers with 5 petals of white or pink color and set seeds. Hybrids from *J. curcas* L. and *J. multifida* L. had leaves with 7 lobes, whereas hybrids from *J. curcas* L. and *J. podagrica* Hook. had leaves with 3-5 lobes and joining site between petiole and leaf blade as same as *J. podagrica* Hook. The hybrids of both pairs had green leaves and pink flowers, but were not fertile. No hybrid from the cross between *J. curcas* L. and *J. gossypifolia* L. was obtained from this study. Genetic similarities based on AFLP DNA fingerprints between *J. curcas* L. and *J. integerrima* Jacq./ *J. podagrica* Hook./ *J. gossypifolia* L./ *J. multifida* L. were 65%, 56%, 54% and 53%, respectively. The carmine staining of the F₁ pollens resulted in dark-stained and well-formed pollens, indicating high pollen viability of F₁ hybrids. Pollen germination study using fluorescence microscopy showed that the pollen tube reached the ovary within 2-4 hours. No twisted pollen was observed. Serial backcrossing of F₁ hybrids from *J. curcas* L. and *J. integerrima* Jacq. to *J. curcas* L. was performed resulting 18 BC₁, 100 BC₂ and 20 BC₃ were obtained. Morphological characters of all the derived backcross plants were evaluated in 134 plants from open pollination and 2 hybrids from BC₁x F₁ and the results indicated that some plants showed potential for high yield. In addition, plants with continuous flower production or with resistance to pests were also observed. For seed oil contents evaluation in some hybrids, BC₁196* with light seed weight contained only 29.92% oil content in kernel, while BC₁202* gave the highest oil content at 50.93%. Preliminary study of the hybrid response to BA application was performed and found that the hybrids gave a good response to BA at 160 ppm. The number of inflorescence, female flowers and perfect flowers were significantly increased in the BA treated plants. The hybrids with good performance will be useful for *J. curcas* L. improvement project in the future.

Student's signature

Thesis Advisor's signature