

LEMBAR HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH: di Jurnal Internasional Terindek bereputasi

Judul Penelitian : **Socio economical evaluation of Uncaria gambir cultivation systems in West 'Sumatra, Indonesia.**
 Nama Peneliti : **David Malik, Aflizar, Synthia Ona Afner, Akira Fukuda and Tsugiyuki Masunaga**
 Identitas Penelitian :
 a. Jenis Penelitian : **Artikel di Jurnal Internasional Terindek bereputasi**
 b. Pembiayaan : -
 c. Nomor Surat Perjanjian:
 Pelaksanaan Penelitian: 2020
 d. Jumlah halaman : 11 halaman
 Nama Link : https://www.jstage.jst.go.jp/article/tropics/29/3/29_MS19-15/_pdf/-char/en
 Unit Kerja : Politeknik Pertanian Negeri Payakumbuh
 Hasil Penilaian :

Komponen yang dinilai (bobot yang dinilai ditetapkan dalam %)	Nilai Maksimal Penelitian		Nilai Akhir Yang Diperoleh
	Internasional <input checked="" type="checkbox"/>	Nasional <input type="checkbox"/>	
a. Kelengkapan unsur laporan penelitian (10%)	9.6 X 10%	... X 10%	9,6
b. Ruang lingkup dan kedalaman pembahasan (30%)	9.5 X 30%	... X 30%	28,5
c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%)	9.4 X 30%	... X 30%	28,2
d. Kelengkapan unsur dan kualitas hasil penelitian (30%)	9.6 X 30%	... X 30%	28,8
Total = (100%)			95,1

Atas dasar tabel di atas, nilai karya tersebut adalah **a. Amat Baik (A)**, b. Baik (B) c. Cukup (C)

TANJUNG PATI, 22 September 2022

Reviewer: 1

Handwritten signature
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 NIP. 1973081199032052

Catatan :

- Bubuhkan nilai pada kolom yang sesuai dengan karya ilmiahnya Rentangan nilai 50 – 100
- Konversi nilai angka ke huruf dan sebutannya: 81 – 100 : A (amat baik); 66 – 80 : B (baik); ≤ 65 : C (cukup)

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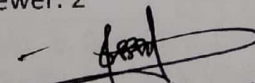
Unit Kerja : Politeknik Pertanian Negeri Payakumbuh

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Komponen yang dinilai (bobot yang dinilai ditetapkan dalam %)	Nilai Maksimal Penelitian		Nilai Akhir Yang Diperoleh
	Internasional <input checked="" type="checkbox"/>	Nasional <input type="checkbox"/>	
Kelengkapan unsur isi hasil penelitian (10%)	96... X 10%	... X 10%	9,6
Ruang lingkup dan kedalaman pembahasan (30%)	94... X 30%	... X 30%	28,2
Kecukupan dan kemitakhiran data/informasi dan metodologi (30%)	95... X 30%	... X 30%	28,5
Kelengkapan unsur dan kualitas laporan hasil penelitian (30%)	95... X 30%	... X 30%	28,5
Total = (100%)			94,8

TANJUNG PATI, 22 September 2022

Reviewer: 2


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	Internasional <input checked="" type="checkbox"/>	Nasional <input type="checkbox"/>	
a. Kelengkapan unsur isi hasil penelitian (10%)	$(96 + 96) / 2 \times 10\%$	(..... +) / 2 X 10%	96
b. Ruang lingkup dan kedalaman pembahasan (30%)	$(95 + 94) / 2 \times 30\%$	(..... +) / 2 X 30%	28,35
c. Kecukupan dan kemitakhiran data/informasi dan metodologi (30%)	$(94 + 95) / 2 \times 30\%$	(..... +) / 2 X 30%	28,35
d. Kelengkapan unsur dan kualitas laporan hasil penelitian (30%)	$(96 + 95) / 2 \times 30\%$	(..... +) / 2 X 30%	28,65
Total = (100%)			94,95

Atas dasar tabel di atas, nilai karya tersebut adalah: a. Amat Baik (A), b. Baik (B) c. Cukup (C)
 TANJUNG PATI, 22 September 2022

Reviewer 2

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Reviewer 1,

Dr. Eka Susila, S.P., M.P.
 NIP. 197308111991032002

Catatan :Bubuhkan nilai pada kolom yang sesuai dengan karya ilmiahnya; Rentangan nilai 50 – 100; Konversi nilai angka ke huruf dan sebutannya: 81 – 100 : A (amat baik); 66 – 80 : B (baik); ≤ 65 : C (cukup)

ORIGINAL ARTICLE

Socio economical evaluation of *Uncaria gambir* cultivation systems in West Sumatra, IndonesiaDavid Malik^{1,2}, Afizar³, Synthia Ona Guserike Afner³, Akira Fukuda¹ and Tsugiyuki Masunaga^{1*}¹ Faculty Life and Environmental Sciences, Shimane University, Matsue, 690-8504, Japan² Faculty of Economy, University of Baiturrahmah, Jl. Raya By Pass km 15, Aie Pacah, Koto Tangah, Padang, West Sumatra 25586, Indonesia³ Agriculture Polytechnic of Payakumbuh, Jl. Raya Negara KM. 7 Tanjung Pati, Koto Tuo, Harau, Kabupaten Lima Puluh Kota, Sumatera Barat 26271, Indonesia

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Received: March 22, 2020 Accepted: July 27, 2020 J-STAGE Advance published date: November 1, 2020

ABSTRACT *Uncaria gambir* (Ug) is the main ingredient for producing Gambir which is an international trading commodity that Indonesia has shared its production of 80% in the world. This paper investigates the type of Ug cultivation system in West Sumatra and its contribution to farmers' income security. Rapid rural appraisal was used for collecting data. Economic analysis is carried out consisting of Benefit and Cost ratio (B/C Ratio), net present value (NPV), internal rate of return (IRR), sensitivity test on the discount rate and Gambir production. Six Ug cultivation systems were found, namely Ug-Mono, Ug-Rubber, and Ug-Areca nut in Lima Puluh Kota regency (LPKR) and in Pesisir Selatan regency (PSR) Ug-Durian, Ug-Durian-Jengkol and Ug-Durian-Petai. In general, The Ug cultivation systems combined with Durian and Jengkol or Petai, that were found valuable additional crops, were more stable in income generation against to the fluctuation of Ug production and Gambir price. Among the six, the highest B/C Ratio was found in Ug-Durian-Jengkol (2.8) while the lowest was in Ug-Mono and Ug-Rubber (1.9). Moreover, Ug-Durian-Jengkol show better NPV and IRR in the most conditions of Gambir price from 10,000 to 100,000 Rp kg⁻¹ as well as Gambir production from 2,400 to 4,800 kg y⁻¹. On the other hand, NPV and IRR of Ug-Mono, -Rubber or -Areca nut systems sharply decreased with the decrease of Gambir price. These systems relied more on Ug production and Gambir price in the income generation. It exhibited the vulnerability of income structure of these systems. From the results, to secure farmers' income from volatility of Ug production and Gambir price, this research suggested Ug cultivation systems combining with durian or other profitable cash crops in West Sumatra.

Key words: BC Ratio, NPV, IRR, Cultivation systems, Gambir, *Uncaria gambir*

INTRODUCTION

Gambir is a dried sap extracted from *Uncaria gambir* (hereafter, Ug) leaves and twigs. This plant has a high concentration of catechin between 7-33% and tannin between 20-55% (Zhalimi 2006). Local people use Ug leaves as traditional medicine and Gambir for betel mixture. In pharmaceutical industry, Gambir is used as an ingredient for production of medicine such as antioxidants, and piles used for stress regulation and inflammatory bowel diseases (Anggraini et al. 2011; Chobot et al. 2009; Fan et al. 2017). In the textile industry, Gambir is used for sunlight proof color agent and leather processing (Zhalimi 2006). Currently, developments on the use of Gambir are applied in several other industries such as; the food, beverage and chemical industries (Rauf et al. 2015). Ninety seven percent of Gambir produced in Indonesia is exported to India,

Pakistan, and Bangladesh while the rest is exported to Japan, Malaysia, Singapore, Thailand, Brunei Darussalam, Bahrain and United States. The demand for the Gambir produced has continue to increase yearly with the growth of textile and pharmaceutical industries in India and other importing countries. India alone imported Gambir worth US \$ 32 million with a volume of 14,312 ton from Indonesia in 2012, which shared 99% of world trade (Directorate General for National Export Development, 2015).

Gambir production consists of two steps, i.e. Ug cultivation-harvest and Gambir production which is the extraction of Gambir composition from the leaves and twigs. The Ug is cultivated by local farmers only, while the extraction is conducted by the Ug cultivating farmers (hereafter, Ug farmers) and sometimes by companies that buy the Ug harvests from local farmers. Indonesia is the largest Gambir producing country and is the worlds' first

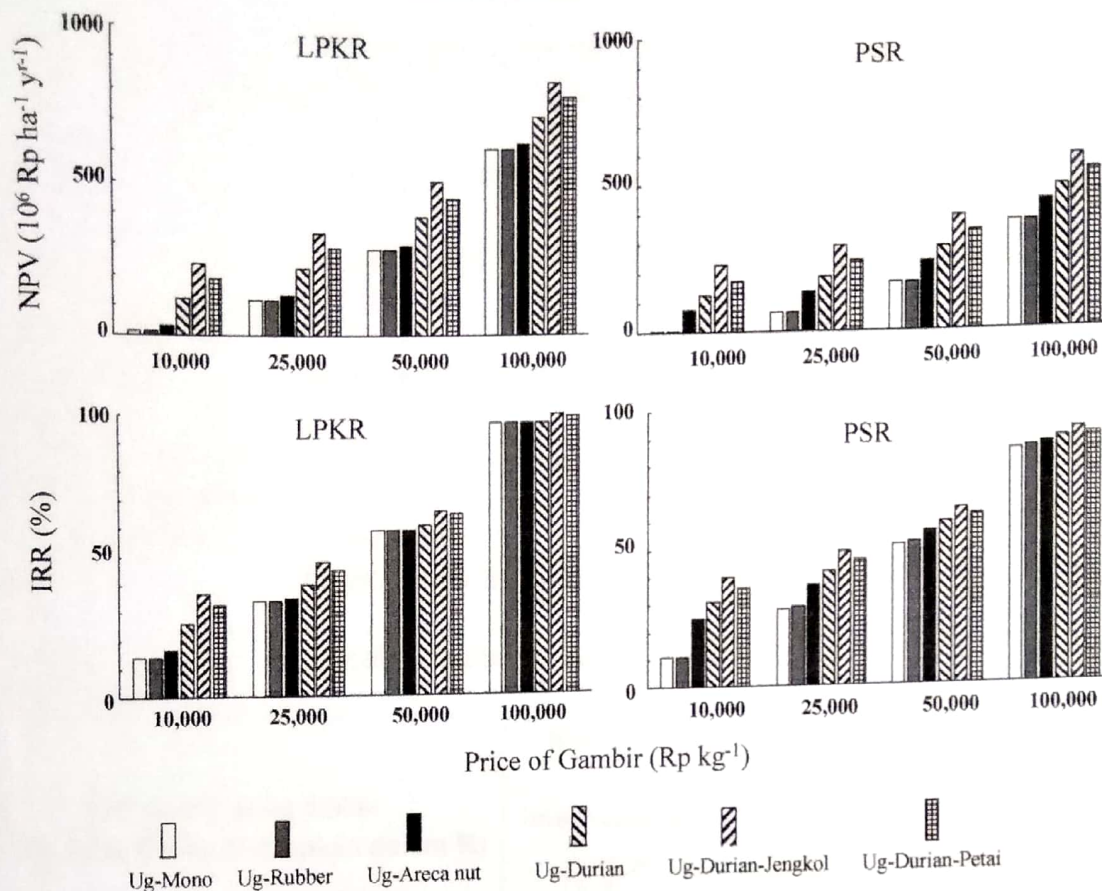


Fig. 2. Simulation of farmer's income (upper panels for NPV and lower panels for IRR) at different Gambir prices in LPKR (right panels) and PSR(left panels).

which made the farmers income structure less stable against to the fluctuations of Ug production and Gambir price. In order to improve and secure Ug farmer's income, this research suggested Ug farmers, especially Ug Mono farmers, to shift their Ug cultivation systems combined with other profitable cash crops, ex. durian.

ACKNOWLEDGEMENTS The authors thank to University of Baiturrahmah for providing funding for this study. The authors also thank the faculty of Life and Environmental Sciences in Shimane University for financial supports in publishing this report. We are highly indebted to the head of the villages and the farmers at the study sites for giving us permission to do this research, valuable information as well as their participation and contribution to the survey.

REFERENCE

- Ajjur S, Jette R, Jacobsen B, Robert J, James H, Sunderland T. 2017. Finding alternatives to swidden agriculture : does agroforestry improve livelihood options and reduce pressure on existing forest ? *Agroforestry Systems*, 91 (1), 185-199. <https://doi.org/10.1007/s10457-016-9912-4>
- Anggraini T, Tai A, Yoshino T, Itani T. 2011. Antioxidative activity and catechin content of four kinds of *Uncaria gambir* extracts from West Sumatra, Indonesia. *African J. of Biochemistry Research*, 5 (1), 33-38.
- Chobot V, Huber C, Trettenhahn G, Hadacek F. 2009. (±)-Catechin: Chemical weapon, antioxidant, or stress regulator? *Journal of Chemical Ecology*, 35 (8), 980-996. <https://doi.org/10.1007/s10886-009-9681-x>
- Dendi A, Shivakoti GP, Dale R, Ranamukhaarachchi SL. 2005. Evolution of the Minangkabau's shifting cultivation in the west Sumatra highland of Indonesia and its strategic implications for dynamic farming systems. *Land Degrad. Develop.*, 26 (15), 13-26. <https://doi.org/10.1002/ldr.641>
- Directorate General of Estate Crops. 2013. Tanaman Rempah dan Penyegar. In B. Sad Juga & L. Lukmana Sukriya (Eds.), *Tree crop estate statistic of Indonesia 2012-2014*. pp. 39-58. Directorate General of Estate Crops - Ministry of Agriculture Indonesia. Jakarta. <https://docplayer.info/72579783-Tanaman-rempah-dan-penyegar-spices-and-beverage-crops.html> (cited March 12, 2018)
- Fan FY, Sang LX, Jiang M, McPhee DJ. 2017. Catechins and