**Research on the Ageing of Myanmar’s Farmers: Implications for Agriculture and Food Security**

**Literature Review**

Search engines used:

* Googlescholar (terms used: Myanmar AND farm; Myanmar AND farming; Myanmar AND farm AND ageing).
* Scopus (terms used: Myanmar AND farm; Myanmar AND farming).
* Medline (terms used: Myanmar AND farm; Myanmar AND farming).

Focus:

* challenges faced by (Myanmar’s) smallholder farmers in the context of demographic change.
* responses to these challenges- both policy and personal responses.

|  |  |  |  |
| --- | --- | --- | --- |
| **Reference** | **Focus/ Aims** | **Methodology** | **Main Findings** |
| Fujisaka, S., Moody, K., & Ingram, K. (1993). A descriptive study of farming practices for dry seeded rainfed lowland rice in India, Indonesia, and Myanmar. Agriculture, ecosystems & environment, 45(1), 115-128. | To examine farmers’ traditional dry seeded rice systems. | Surveys, interviews in Indonesia, India and Myanmar. | Practice was related to soil quality, water etc. Farmers’ experience was key. |
| Brown, P. R., Yee, N., Singleton, G. R., Kenney, A. J., Htwe, N. M., Myint, M., & Aye, T. (2008). Farmers' knowledge, attitudes, and practices for rodent management in Myanmar. International Journal of Pest Management, 54(1), 69-76. | To examine the importance of rodents, farmers’ perception of the causes of yield loss, and their beliefs as to why they undertake rodent management. | A survey of 350 farmers from lowland rain-fed agricultural system of central Myanmar. | Main constraints:   * pests (29.4%) (of which 48.6% said insects (48.6%), followed by rats (40.9%)) BUT also said rats caused the most damage and most important to control (47.7%); * insufficient water (19.4%).   Responses:   * 61.1% applied rodent control individually; * 81% thought rodenticides were not safe but 33% used them. |
| Devendra, C., & Thomas, D. (2002). Smallholder farming systems in Asia. Agricultural systems, 71(1), 17-25. | A review of farming practice in South-East Asia. | Secondary data analysis. | Found changes in the region in terms of cultivation due to deforestation, erosion and weeds. Rain is an issue- in Myanmar, 89.9% of total arable land is rain-fed and the production from it accounts for 61.1% of agricultural GDP (the highest in SE Asia), with 46% of the population dependent on rain-fed agriculture. Soil erosion is an issue in NE Myanmar. |
| Okamoto, I. (2011). How do poor rural households in Myanmar cope with shocks? Coping strategies in a fishing and farming village in Rakhine state. The Developing Economies, 49(1), 89-112. | To examine how poor rural households in Myanmar cope with shocks (sickness, death of a household member) which incur unexpected expenditure. | Survey in Rakhine State, Myanmar (n=76). | Self-insurance/ dissaving is the main coping strategy- seeking help outside of the home is not favoured due to high levels of interest and no culture of mutual insurance in the community. |
| Lon, Y., Hotta, K., & Nanseki, T. (2011). Impact of land fragmentation on economic feasibility of farmers in rice-based farming system in Myanmar. Journal of the Faculty of Agriculture, Kyushu University, 56(1), 163-170. | To examine socio-economic characteristics,  rice yield and profitability of farm households under different land fragmentation levels; and to estimate the effects of land fragmentation on rice productivity. Landlord system abolished in 1964- farmers now given land owned by the state which cannot be transferred or mortgaged, but is passed on through families. | Survey of 143 farms from four villages in Yamethin Township, Mandalay Division. Age of  household heads ranged from 25-77 but the average age was 52 in farms with low fragmentation, 53 for medium and high. Low educational attainment in the sample. Farm income made up more than 90% of all farms’ household incomes. | Most of Myanmar’s agricultural land (7.9 million hectares/ 19.49 million acres) is made up of small-scale farms (average size 2.35 hectares/ 5.8 acres) with an average of 2.2 plots. Rice makes up 37% of total crops in 2007/8.  Low land fragmentation associated with higher yield and profitability compared to medium/ high fragmentation. 1% increase in number of plots reduces output by 0.21%. Possible explanations: greater degree of fragmentation discourages efficient use of plots which is related to yield- smaller plots used less manure and urea. Makes policy recommendations: 1) tradable land use rights; 2) reduce number of plots; 3) creation of non-farming employment opportunities to reduce land fragmentation and increase socio-economic status of farming households. |
| Kurosaki, T. (2008). Crop choice, farm income, and political control in Myanmar. Journal of the Asia Pacific Economy, 13(2), 180-203. | To address the impact of economic policies agricultural production decisions and rural incomes. Myanmar’s agricultural economy has been moving from a planned system to a market system since the 1980s but limited research on impact on incomes and productivity. | Survey of 500 households in eight villages. | Paper included a theoretical model which predicted the acreage share of non-lucrative paddy would be higher for farmers who are under tighter control of the local authorities- found this was the case. Predictors on paddy acreage share:   * Early adoption of new technology. * Expectation of inheriting land. * Low land field.   Found output could be increased if farmers were given more freedom of land use. |
| Garcia, Y. T., Garcia, A. G., Oo, M., & Hossain, M. (2000). Income distribution and poverty in irrigated and rainfed ecosystems: The Myanmar case. Economic and Political Weekly, 4670-4676. | Looks at impact of government income redistribution and poverty interventions. | Household survey (1996) of four villages. | Government had focused on promoting new technology for farming and irrigation in a very top-down way- unsuccessful in increasing household income because farmers could not use it in an optimal way (needed time, money, labour). In fact, it had an adverse effect on in particular irrigated areas. However, once farmers become used to the new technology and irrigation and can start ‘double-cropping’, poverty could decrease.  Household size, education and higher proportion of female members were related to poverty. |
| Win, N. K., & Chumjai, P. (2009). Farmersû Adoption of Improved Technological Knowledge on Soybean Production in Northern Shan State Area, Myanmar. Kasetsart Journal, Social Sciences, 30(2), 227-238. | To examine the socio-economic characteristics of farmers, their knowledge of soybean production and barriers to the adoption of successful soybean cultivation techniques in Myanmar. | ‘Interviews’ with 377 soybean farmers. | Adoption of improved production techniques (aside from using new varieties) was less than 50% in the sample. Adoption of improved soybean farming techniques related to: 1) farmers’ education level; 2) availability of family labour; 3) farm income; 4) access to credit; 5) non-farming employment; 6) farmers’ knowledge of soybean production; 7) ‘extension activities’ e.g. home or farm visits, group activities and demonstrations.  Problems faced by farmers: 1) access to credit; 2) different varieties; 3) fertilisers; 4) technical knowledge; 5) access to extension activities. |
| Matsuda, M. (2011). Intensification level of rice farming in Myanmar: implication for its sustainable development. Environment, development and sustainability, 13(1), 51-64. | Aims to create an estimate of the intensification of rice farming in Myanmar. | Surveys | Found variation in chemical fertilizer use according to irrigation versus rain-fed plots. Compared fertiliser use efficiency with China and Vietnam- intensification level of Myanmar not inadequate like China and Vietnam. Myanmar Government has promoted rice production through technological extension services and irrigation but also has restricted export to maintain a low and stable price. As such, farmers cannot invest extensively in rice farming. Author argues if rice exports were liberalised, price would rise and farming could be intensified, especially in irrigated lowlands. Also cautions that increasing productivity may create issues in terms of sustainability. |
| Egashira, K., & Than, A. A. (2006). Cropping characteristics in Myanmar with some case studies in Shan State and Mandalay Division. 九州大学農学部紀要, 51(2), 373-382. | Examines rainfall, irrigation and crop production in Myanmar. | Secondary data analysis. | In regions under rain-fed agriculture, crops were selected according to rainfall conditions. In dry regions, pulses and edible-oil crops were selected; in upland with increasing rainfall crops included upland rice, maize, wheat, garlic, potato, ginger, taro, sweet potato, vegetables and some pulses; lowland crops included paddy rice, garlic, niger, chickpea, sunflower and tomato. Under-irrigated areas focused on monsoon paddy and summer paddy. |
| Htoo, K. S., Singhapreecha, C., & Sirisupluxna, P. (2011). Factors contributing to poverty incidence in irrigated and rainfed ecosystems in central Myanmar (2008). Kasetsart Journal, Social Sciences, 32 : 104 – 114. | To examine the incidence and severity of poverty in farming houses in under-irrigated and rain-fed regions of central Myanmar. | Secondary data analysis of household survey (n=370). | Found mean per capita income was higher in irrigated households than for rain-fed households; percentage of households below the poverty line was lower for irrigated than rain-fed households. Household size increases probability of poverty but can be reduced by changing from rain-fed to irrigated system which increases productivity and jobs. More farm-job workers, especially women in households related to reduced probability of poverty. Females in demand for particular jobs- rice transplantation by hand, hand weeding, cleaning and drying rice. |
| Soni, P., & Soe, M. N. (2016). Energy balance and energy economic analyses of rice production systems in Ayeyarwaddy Region of Myanmar. Energy Efficiency, 9(1), 223-237. | Examines the energy balance and economics of irrigated and non-irrigated rice production systems. | Data from 51 irrigated and 54 rain-fed farms in Northern Ayeyarwaddy  Region, Myanmar. Fossil fuel, fertilizers, chemicals, human labor and draft cattle used, farm yard manure (FYM), seed, and machineries used were recorded as inputs, and rice (paddy) production (main product) and straw produced were noted as outputs for each farm. | The energy benefit–cost ratio was higher in rain-fed rice than in irrigated rice system. Production is proportionate to the amount of energy used in both systems. Found the two systems were not statistically different for their energy efficiencies. In rain-fed systems, farmers apply lower quality fertiliser to reduce losses due to surface runoff; and do not pump irrigation water which uses energy. |
| Matsuno, Y., Horino, H., & Hatcho, N. (2013). On-farm irrigation development and management in lower Myanmar: factors for sustainable rice production and collective action. Paddy and Water Environment, 11(1-4), 455-462. | Aims to address the impact of irrigation on dry season rice production in Myanmar. | Case study (2003 to 2009 in the middle reaches of the Ngameoeyeik). Used a survey and interviews. | Found that on-farm infrastructure development increased productivity by increasingly amount of water, flexibility of water distribution and improved drainage. Where farmers were involved in design of system, they were more likely to then be involved in maintaining irrigation system. Cite other studies which have found introduction of introduction of irrigation systems was problematic because they were not backed up with the appropriate infrastructure and were delivered in a ‘top down’ way. |
| Htwe, N. M., Singleton, G. R., & Maw, P. P. (2016). Post‐harvest impacts of rodents in Myanmar; how much rice do they eat and damage?. Pest management science. | A study of post-harvest losses caused by rodents 3-6 months post-harvest. | Excavated rat burrows and weighed grain stored inside in Ayeyarwady Delta, Myanmar. | Rice is harvested and stacked on levee banks for 4-6 weeks before it’s threshed and stored. During the piling and storing of the grain, on average enough rice was lost to fee households for 1.6-4 months. Post-harvest loss is therefore a significant issue for smallholders. |
| Thawnghmung, A. M. (2003). The socio-economic impacts of rice policies implementation in rural Burma/Myanmar. Sojourn: Journal of Social Issues in Southeast Asia, 299-321. | Explores two cases studies where government experimented with a variety of agricultural programmes- looks at the governance of the agricultural administration. | Policy analysis, interviews, observations. | Five farming-related agencies in Myanmar, low wages of staff leads to corruption and embezzlement. Also difficult for farmers to pass information on actual (negative) reports of farming conditions up to a particular ministry because of these local gatekeepers. Also often military officers have been appointed to civilian ministries and they lack experience of farming and cannot therefore formulate appropriate local farming policies. |
| Matsuda, M. (2013). Upland Farming Systems Coping with Uncertain Rainfall in the Central Dry Zone of Myanmar: How Stable is Indigenous Multiple Cropping Under Semi-Arid Conditions?. Human Ecology, 41(6), 927. | Multiple cropping systems are prevalent in semi-arid climate to compensate for unstable conditions. Author argues few studies have focused in depth at how multiple cropping reduces instability of production. | Longitudinal interviews with farmers. (n=37). | Farmers were operating a multiple cropping system to counteract the instability related to lack of irrigation. They would often experience the complete failure of a particular crop. Pests and lack of water were issues, as was sudden heavy rainfall. |
| Htwe, T. N., Kywe, M., Buerkert, A., & Brinkmann, K. (2015). Transformation processes in farming systems and surrounding areas of Inle Lake, Myanmar, during the last 40 years. Journal of Land Use Science, 10(2), 205-223. | Inle Lake (E Myanmar) has undergone rapid population increase and growth in agriculture and tourist sectors. This paper aims to map those changes. | Compared historical Corona images (1968) and Landsat data (1989, 2000 and 2009). | Changes observed:   * Urbanisation (+203%) * Crop expansion (+34%), in particular floating gardens (+390%), land abandonments (+167%) and deforestation (-49%). |