

Accompanying the ‘maize boom’ in the Kham basin and Nonghet district

Since the mid-2000s, land-use in Kham basin and Nonghet hillsides has come to be dominated by hybrid maize mono-cropping. The rapid expansion of this commercial crop has a tremendous impact on both the local economy and the environment. Maize has not only replaced existing gardens, chilli and fruit tree plantations but it has also expanded at the expense of forests and former fallow land. With the transition towards intensive commercial agriculture, agricultural productivity has increased considerably while rural poverty has receded. Yet, a growing number of farmers are now confronted with land degradation issues (e.g. soil erosion, lowland siltation, weed pressure and chemical pollution), excessive production costs and indebtedness. In this context, the activities promoted by PRONAE have focused on accompanying the ‘maize boom’ and, in particular, mitigating its potentially negative impacts by developing DMC-based maize cropping systems.

Maize and agricultural intensification

Characterized by a warm micro-climate, fertile soils and a good accessibility, the Kham basin allows for an important diversity of upland commercial productions (e.g. fruits trees, vegetables, chilli, maize). Located at the eastern part of the basin, the limestone soils of the mountainous Nonghet district are also quite productive despite the steeper slopes. Since the mid-2000s, land-use in Kham basin and Nonghet hillsides has come to be dominated by hybrid maize mono-cropping. The rapid expansion of this commercial crop – along the national road no. 7 linking Phonsavanh, the provincial capital, to Vietnam – has a tremendous impact on both the local economy and the environment. Maize has not only replaced existing gardens, chilli and fruit tree plantations but it has also expanded at the expense of forests and former fallowed areas. At the exception of a few villages with limited access to the lowlands for paddy rice production, upland rice areas have decreased significantly. The success of this cash crop can be explained by (i) the important incomes and labour productivity gains that it generates, (ii) the ease of production and hardiness of the plant that require no specific technical knowledge, (iii) low input and low investment limiting economic risk, (iv) the proximity of the main outlet - Vietnam - from where hybrid seeds are imported, and where maize production is exported for animal feed.

This impressive agricultural intensification process has occurred as a corollary to the introduction of hybrid cultivars in the region. Improved maize seeds are planted at higher density and they are generally more productive

than traditional varieties. With greater agricultural income and investment capacity, mechanical ploughing has then become the main technique for preparing the agricultural plots (Figure 1). Thus, many farmers of the Kham basin have recourse to service providers for their ploughing operations with tractors and ploughs¹. Along the national road, mechanical ploughing has rapidly expanded towards Nonghet district, where it is (partly) replacing traditional slash-and-burn techniques and competing with conservation techniques developed by the National Agro-Ecology Programme (PRONAE). Herbicides such as atrazine, gramoxone and glyphosate are commonly used during the cropping sequence².

Komone village provides a good example of the rapid expansion of hybrid maize and the intensification of cropping practices. In this village, maize mono-cropping has developed very rapidly over the past three years and, in 2010, a large majority of farmers started spraying herbicides with motor-pumps. Traders have played a key role in fostering this transition - pushing farmers to plant hybrid maize seedlings in 2008, introducing herbicides in 2009 and motor-pumps in 2010. Informal information exchange with other villages and direct observation also played a key role in these land-use transformations. In contrast with more accessible areas, however, mechanical ploughing has not yet reached the village.

Although the transition towards intensive hybrid maize mono-cropping is occurring on a very large scale, some villages appear to oppose some resistance to the process. In Keopathou village for instance, despite proximity with

Figure 1: Ploughing in Pakhae Tay village (Feb. 2010)



the district capital, villagers have maintained a traditional Hmong agriculture based on the cultivation of upland rice and traditional maize varieties (with plots slashed and burned and ploughed by hand). Dedicated to the fattening of fighting bulls, improved pastures (based on elephant grass or nia oysan) are also common in the village. While some attempts were made to introduce hybrid maize in 2008, low production and low prices pushed the villagers to revert back to their traditional varieties in 2009.

Diffusion of conservation agriculture

In this context, the activities promoted by PRONAE have focused on accompanying the ‘maize boom’ and, in particular, mitigating its potentially negative environmental impacts by developing DMC-based maize cropping systems. For that purpose, the project offered technical support through agricultural extension equipment lending and training on the safe and sustainable use of pesticides. Improved pasture systems were also proposed by the project but, as the area has long been focused on crop production, pasture-related innovations had less success than in other agro-ecological zones where animal production represents a key livelihood component (e.g. Pek and northern Kham).

As a result of these efforts, DMC systems effectively covered a small proportion of the total upland areas cultivated in Kham basin in 2009. However, the cropping model that really imposed itself is the one based on soil tillage (Figure 2). DMC had more success in Nonghet hillsides as the steep slopes prevented tractor access. However mechanical ploughing expanded quite significantly in the area. In 2010, many farmers who were previously engaged in conservation agriculture started to till their maize plots-when ploughing service providers started prospecting upstream of the Kham basin. The status of conservation agriculture appears thus rather unsettled in the area and farmers with sufficient capital tend to shift from slash-and-burn or DMC systems to ploughing-based systems.

Constraints to adoption

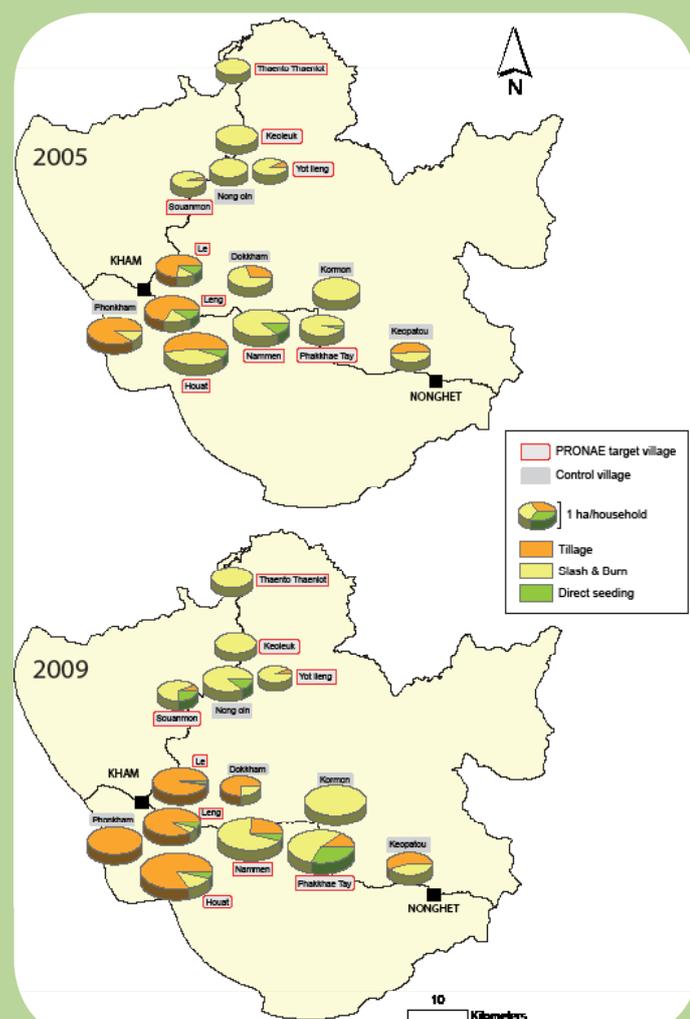
Intensive, tillage-based maize mono-cropping is just emerging in Xieng Khouang province. Therefore, in contrast with what has been reported in other regions of Laos (e.g. southern Sayaboury province), the system has not yet reached nor shown its limits in terms of soil erosion, soil fertility depletion, weed resistance to herbicides and water pollution. None of the interviewed farmers reported soil erosion issues, neither in the gently sloping lands of the Kham basin nor in the hilly areas of Nonghet district. Soil fertility depletion did not appear as an issue (i.e. organic manure or chemical fertilizers have not been used so far). Instead, at this initial stage of ‘conventional agriculture’ introduction, soil tillage and herbicides are perceived by local people as having very positive impacts on local livelihoods – improving agricultural productivity and incomes while reducing agricultural workload.

Thus, without experience (or knowledge) of the potential downsides of the current agricultural transition, farmers do not feel the need to invest time and capital in alternative cropping systems. As a matter of fact, while most of the interviewed farmers who took part in the PRONAE activities reported that they understood the logic and functioning of the proposed conservation techniques, they also considered that there was no pressing need to apply them as the soil quality was still fairly good and as they would still have the capacity to do so in the future. Similar to what had been observed in southern Sayaboury province³, this latter perspective was made particularly explicit by the farmers of Phakhae Tay village. They suggested that, in the future, they would probably alternate ploughing with DMC systems as a way to manage soil fertility.

Conclusions and recommendations

For different reasons, the recent and rapid development of ploughing-based maize monoculture in the districts of Kham and Nonghet is alarming. As already observed in Sayaboury province, agricultural intensification and heavy mechanisation can have rather negative ecological impacts, including increased soil erosion, siltation of the lowlands, gradual soil exhaustion, weed invasion and water pollution. Without proper technical guidance from extension agents, farmers rely on traders to select and use agricultural inputs like pesticides and cultivars – with serious associated risks not only in terms of economic dependency but also, in case of misuses⁴, in terms of farm indebtedness, human and animal intoxication and environmental degradation. DMC systems can represent a viable alternative, allowing farmers to benefit from improved farm produc-

Figure 2. Evolution of cropping techniques in Kham and Nonghet districts (2005-2009)



tivity and greater incomes while mitigating the environmental impacts of the transition.

Yet, in a context where farmers have no experience of the potential negative impact of the ‘conventional’ agricultural practices, they perceive it as the best option both in term

of economic risk management and in term of family labor management. Incentives appear rather limited to maintain or to adopt alternative, more sustainable cropping systems. Recommendations can be made that could help anticipating and mitigating the negative impacts of the current ‘maize boom’:

1. In order to limit the risks associated with the current agricultural transition, further technical support (e.g. cultivar selection, sowing techniques and crop associations/rotations, pesticide dosage and safety precautions) should be provided by agricultural extension services in combination with innovative fencing techniques or livestock management regulations⁵ in order to maintain DMC systems as a possible option for the farmers of the area,
2. In order to provide greater incentives for farmers to shift towards more sustainable cropping systems, awareness-raising campaigns should be conducted to inform farmers of the medium and long-term impacts of current agricultural practices. In line with the latter, monitoring systems (e.g. crop and sediment yields, water quality) could also be established at the village level,
3. As long as the environmental drawbacks of ‘conventional agriculture’ are not perceptible by local farmers, only strong policy incentives and regulations (e.g. ban on mechanical ploughing on steeply sloping lands), combined with extension activities conducted in close collaboration with research agencies can prevent the rapid expansion of non sustainable practices associated with the boom crops such as maize.

Endnotes

¹Some of these service providers come from provinces that engaged earlier in a similar ‘maize boom’ (e.g. Sayaboury, Oudomxay).

²As reported during interviews, farmers consider that, as long as they follow application protocols, the use of herbicides does not raise concerns relative to their negative impact on health and the environment.

³Slaats, J., and G. Lestrelin. 2009. Improving cropping systems by introducing Conservation Agriculture: Taking stock of the results and methodology of research-development in southern Sayaboury province, Lao PDR. Programme de Capitalisation en Appui à la Politique de Développement Rural, Vientiane.

⁴A first case of water pollution by pesticides was reported by Ban Houat interviewees, apparently without consequences for the use of herbicides in the village.

⁵In order to prevent animal damages to the mulch or cover crop during critical winter time.

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