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An analysis of Contract Spray Services

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Introduction

The Hortifresh project (https://www.hortifresh.org) aims to focus on sustainable production of fruits and vegetables in Ghana and Ivory Coast. The project has considered the use of professional spray teams as part of the sustainability approach.

Contract spray services have been promoted and implemented in diverse agricultural projects in order to ensure correct application of pesticides and reduce risks to human health and the environment. There are various modalities of contract spraying, government supported mass-spraying carried out by so-called 'spraying gangs' which are often provided for free to a more organised and controlled Spray Service Provider (SSP) approach as promoted by CropLife[1]. This brief provides a short overview of considerations and challenges from the implementation of contract spraying in Ghana[2], Nigeria[3], Ethiopia and Kenya[4] which can be used to improve the adoption of this concept for the implementation in the Hortifresh project.

One of the considerations described in this brief is that contract spray services models are not always reaching the outcomes that they aim to achieve. If we look at the business model, there are still plenty of challenges that affect the motivation of people to engage in this activity for example the seasonality, the lack of demand, the low profitability, and the lack of resources available. In regards to the reduction of pesticides exposure, contract spray services are not always as effective as expected. Short trainings on the good use of pesticides do not necessarily result on higher adoption of Personal Protective Equipment (PPE), although awareness of the pesticide risks is part of the learning process.

In relation to pesticides reduction, it remains difficult to endorse a model in which pesticide use is considered a key element within the IPM concept. Spraying gang models that provide pesticides for free or subsidise the use of pesticides may not totally be compatible with IPM programs which aim to reduce the overreliance on pesticides. There is still a lot to be done to increase the adoption of non-chemical pest control methods, putting prevention and good agricultural practices as priority measures before pesticides are applied. Even though not the prime objective of contract spray services, advice on non-chemical methods could be an additional service they offer.

[1] CropLife Africa Middle East has developed the SSP concept to improve access to quality pesticides and the correct application of these, resulting in higher yields. A Spray Service Provider (SSP) is a farmer, young graduate or agro-dealer who has received special training to apply pesticides and who hires out his services to (fellow) farmers to spray their lands (CropLife).

[2] CODAPEC is a centralized system of spraying gangs lead by the national government known as the 'Mass Spraying'. The programme aimed to assist cocoa farmers in pest control of main pest and diseases to reduce crop losses and increase cocoa yields. As a National initiative, the spraying gangs, set-up since 2001, are in charge of spraying pesticides recommended by the government, and pesticides are also provided to farmers with no cost or subsidized (Duker, 2011).

[3] The N2Africa project, through CropLife Nigeria, promotes contract spraying as one of the activities youth can be involved to earn a living in agriculture. The project aims to encourage youth entrepreneurs to start business activities along the value chain of groundnut, soybean and cowpeas. The quoted study is a baseline carried out before project activities were implemented.

[4] SNV has implemented projects to promote contract spray services in several countries including Kenya and Ethiopia. SNV has worked with CropLife in training farmers as Spray Service Providers. The training is done by the staff of private companies.

We recommend contract spray services not to focus only on the correct use of pesticides, but to put more emphasis on prevention of pest and diseases and promotion of non-chemical alternatives or have their activities supported by other organisations (either private or public) so that the contract spray service activities are embedded within the context of IPM. This would greatly benefit farmers' health, the environment and help address the issue of pesticide residues in food. Furthermore, there should be sufficient resources and a better business model for contract spray services to effectively operate and consider it as a profitable business.

Contract Spray Services

Operationalization of contract spray services

One of the contract spray services models that has been studied is the one promoted by the Ghanaian government called the CODAPEC programme. Although the program has been embraced by some farmers, constraints have been identified, including the lack of resources and logistics, lack of availability of PPE, lack of spraying staff which results in only few farmers in communities be served at a particular point in time, lack of spraying machines, inadequate supply of chemicals to spraying gangs. On the other hand, problems related to organization were also noticed. A centralized system of organizing the programme causes delays in pest control as it is difficult to align to the farmer's needs (Duker, 2011).

Unlike the centralized systems, private initiatives can be less complex to operationalize. However, a number of challenges still remain:

1. **Business model and capacity to scale up:** One of the assumptions is that the use of contract spray services is a good way to promote job creation in agriculture. Contract spray services can concentrate in training more sprayers and can offer spray services to more farmers. However, due to the seasonality of the activity, spraying services concentrate mostly during one season. Thus, some contract sprayers find it difficult to make a living from this activity and may look for other jobs which may not necessarily be in agriculture (SNV Kenya). Expanding the service delivery to include services such as soil testing, training farmers on new technologies, tree seedling raising and pruning could may the business more viable, so is the option of promoting IPM on behalf of companies (SNV Kenya). Furthermore in some cases, trained farmers that are part of the contract spray services do not find profitable enough to offer the services due to the low payment they receive (SNV Ethiopia). Besides, the demand for services can vary significantly. In some cases, farmers are not willing to pay for the services of contract spray services as they have permanent employees who have to do all the work on their vegetable production including the spraying. In other cases, the more experienced farmers prefer to do the job themselves (SNV Ethiopia) and the most solid and active contract spray services were the ones that were selected/ recruited from within existing farmer organizations (SNV Kenya).
2. **Resource availability:** Another important consideration is the availability of resources and tools to effectively deliver services. It has been found that some of the contract spray services lack the resources to buy PPEs and spraying equipment. For instance, in Kenya, farmers lack resources to buy their own knapsack sprayers and lack reliable transport system (motorbikes) to enable them cover larger areas (SNV Kenya). Equally a baseline study of contract spray services in Nigeria indicates that only 4% of the contract sprayers had a full set of PPE. The lack of PPE brings high risks to contract spray services to be exposed to pesticides that can affect their health both short and long term.

Moreover, banks and other financial institutions still consider contract spray services very high risk and thus not able to get loans to pre-finance acquisition of some equipment.

3. **Knowledge and skills:** Contract spray services are promoted to reduce the risk for farmers. It is assumed that contract sprayers receive adequate training on pesticide handling, and thus they can handle pesticides appropriately. However, according to an assessment done by Croplife in Nigeria, the knowledge and skills of contract sprayers is still limited. It has been found for example that only 4% of the contract sprayers has a full set of PPE, half indicates to have challenges with reading the label, while knowledge on warning signs, re-entry times and pre-harvest intervals can be improved. In addition more than 60% of the contract sprayers leaves empty containers in the field after spraying which poses high risks to human health and the environment. The assessment indicated that farmers may find beneficial to subcontract the spraying of pesticides because they perceive the knowledge of the contract sprayer on application and pesticides is higher, resulting in a better application, but as described before, this might not always be the case in practice.

   Furthermore, it still questionable if contract spray service models would bring individuals to a higher level of understanding of sustainable pest management and adoption of IPM approaches that focus mainly on the implementation of Good Agricultural Practices, the use of preventive methods and non-chemical pest control strategies as key elements to move away from the reliance of pesticides. Including more IPM topics in the curriculum of contract spray services would be one step forward. However, in some instances it was found that people who carry out spraying are often poor, poorly educated daily labourers with a low social status (SNV Ethiopia).

4. **Formalising contract spray services:** contract spray services are often not recognised as formal structures. Formalising their activities would help their activities as well as the control of how they perform.

   In Ethiopia 4 modalities are experimented with (SNV Ethiopia):

   i. Train farmers on GAP and IPM in Farmers Field Schools (FFSs);
   ii. Train selected FFS members on spray application and provide them with PPE so that they can become contract spray services;
   iii. Train other selected FFS members on IPM (pest scouting; selection control methods, etc.) and provide them with some PPE and a lockable store so that they can become a Village Pesticide Agent whom are linked to agro-dealers in the nearest district towns;
   iv. Work on the formalisation of contract spray services so that they can be registered and supervised.

   The Ethiopian experience found that the FFSs are crucial; an adoption survey after the first FFS season showed that in areas where farmers had limited experience with vegetable production 75–85% of the farmers learned to identify and control at least one more pest. Half of them learned two pests and some even more. For obvious reasons in areas with experienced farmers less than half of them learned new pests and control methods.

5. **Pesticide reduction:** Another important element to analyse is the impact of contract spray services in the reduction of pesticides, especially those highly hazardous to humans and the environment. In the Ghanaian case on mass spraying in cocoa, the aim to increase crop yields has not resulted in reduction of pesticides or better adoption of IPM, because the model uses calendar applications which goes against the principle of need-based decision making on when to apply pesticides via regular field observation and monitoring. (PAN, 2018). On the other hand, there is insufficient research or priority to IPM alternatives compared with pesticides and this is linked to farmer preferences for chemical solutions.

Spraying gang models that provide for free or subsidise pesticides may not totally be compatible with IPM programs in the sense that many of them rely solely on chemical pesticides and the capacity to innovate and find alternatives to those chemical pesticides is limited. IPM involves using different methods to keep pest and diseases under control, rather than relying only on a chemical approach. Thus, there seems to be a serious contradiction between provision of free pesticides and spraying services and the IPM principles with the stated pesticide reduction (PAN, 2018). Pest management in cocoa in Ghana is highly dependent on use of Highly Hazardous Pesticides (HHPs), for instance, 11 of the 14 Cocobod-approved active ingredients are toxic to bees. These include the neonicotinoids which have been found to present also acute and chronic health effects (PAN, 2018).

In addition, in low and middle income countries, the recommendations of governments and technical assistants have a pronounced focus on the use of pesticides as an instrumental option for pest control. Many of the available options are actually classified as highly hazardous and that is why several are restricted or banned in developing countries due to the intrinsic hazards they represent. The IPM approach, which goes beyond the monitoring of pests to see when to apply a certain pesticide, has not been widely adopted. The models promoted for pest control should have stronger focus on the implementation of good agricultural practices and prevention strategies followed by non-chemical alternatives and the use of Highly Hazardous pesticides should not be part of the technological package to be promoted.

This is primarily important in horticultural projects that aim to achieve reduction of pesticides residues to satisfy the growing demand of the market in terms of food safety, and especially for those producers involved in certification or willing to join sustainability initiatives that restrict or banned the use of HHPs.

6. **Health hazards and risks of pesticide use:** One important assumption is that contract spray services help to reduce the exposure to pesticides because adequately trained people would use the necessary PPE to reduce any risk of exposure to pesticides. However, as mentioned before, this is not always the case. Contract spray services do not always use PPE when handling pesticides, even after receiving training. This indicates that the exposure risks of workers to pesticides is not necessarily being addressed with these models. It is a challenge to ensure that after a training, workers have higher understanding of the dangers associated with pesticides, especially those long-term effects such as cancer, hormonal and reproductive diseases which are associated with a wide range of pesticides approved and widely used in low and middle income countries.

   Moreover, the diversity of farmers suggest that a blanket approach in which farmers obtain training does not create the intended impact (Waarts *et al.*, 2015). More targeted training and learning interactions should be in place for people to increase their understanding of the risks when handling pesticides. In addition, more farmer's knowledge exchange should be promoted to encourage farmers to adopt certain practice and learn from each other.

   There are other underlying reasons behind the low use of PPE despite workers' awareness of pesticides exposure risks. Andrade-Rivas and Rother (2015) argue that workers' socio-cultural context (i.e. gender dynamics and social status) among other factors play an important role in the adoption of PPE, and therefore given the complexity of PPE compliance, exposure reduction interventions should not rely solely on PPE use promotion. Instead, other control strategies such as elimination and substitution of HHPs should be implemented. PPE should be used as strategy only after elimination, substitution, and engineering and administrative control measures (Lunt *et al.*, 2011).

Conclusions

Contract spray services should not only focus on the correct use of pesticides, and professionalization of this practice, but there should be more emphasis on the principles of IPM and the hierarchy of control model for the reduction of hazardous occupational exposure. This can be done by bringing innovation to the way farmers can deal with pest and diseases, facilitating more knowledge exchange and promoting IPM plans which are targeted to the different needs and diverse agroecosystems. There should be a change in strategies focusing on pesticides provision and more priority given to promotion of good agricultural practices, prevention and non-chemical alternatives.

Services to farmers should evolve to better targeted approaches in order to respond to current trends and needs of the market. Traders and buyers are interested in sourcing from producers that can demonstrate adoption of sustainable practices and from systems with a higher level of assurance in terms of food safety. A more sustainable strategy to reduce overreliance of pesticides should be implemented so farmers can meet international standards and satisfy the growing interest to have less pesticides in food.

The challenges and learnings from the contract spray service models can be used to harness opportunities to enhance the contract spray service model in order to ensure that farmers can get good services and benefit from those models. From these learnings, the following recommendations are given:

1. Creating awareness amongst farmers of the services that contract spray services can offer. Contract spray services should also build trust in the farming communities about the credibility on training, spraying and services offered by them.
2. Training on Integrated Pest Management (IPM) should be enhanced. Knowledge of non-chemical pest control techniques is needed so that contract spray services can effectively advise farmers considering farmer's needs and their particular agroecological conditions. In that way, contract spray services can give better recommendations which are not necessary focus on spraying pesticides.
3. Training on toxicity of pesticides should also include classification systems beyond the traditional WHO classification which only looks at acute toxicity. This is particularly important considering the chronic effects caused by pesticides. The recommendations of the WHO/FAO to classify Highly Hazardous Pesticides[5] (HHPs) and the replacement of HHPs should be part of the trainings given to contract spray services.
4. Training to contract spray services should also include a component on sustainability, requirements of main sustainability standards, and the link between IPM and food safety, so that the advice to farmers can be more effective.
5. Knowledge transfer to farmers should be part of the service package. The professional spraying teams should be able to discuss together with the farmers and seek their involvement on the assessment of pest control options and reflect on the management, the type of good agricultural practices and methods to prevent pest and diseases.

[5] Definition from the International Code of Conduct on Pesticide Management (WHO/FAO, 2017); Highly Hazardous Pesticides are those pesticides that are acknowledged to present particularly high levels of acute and chronic hazards to health or environment according to internationally accepted classification systems such as WHO or GHS or their listing in relevant binding international agreements or conventions. In addition, pesticides that appear to cause severe or irreversible harm to health or the environment under conditions of use in a country may be considered to be and treated as highly hazardous.

6. Knowledge exchange between contract spray services should be promoted so that contract spray services can share experiences and support each other with diagnosis of pest and diseases[6] and with the identification of the best strategy for pest control.

7. Contract spray services should be the monitored for their health. Health checks should be given beyond the normal cholinesterase checks which are only indicative of the exposure to a few pesticides chemical families. There should be stronger link with the National Health Service provider to see what a health check would entail considering the intrinsic hazards of the pesticides used by contract spray services. In addition the general health and nutrition status of those working as a contract sprayer is paramount for their long-term wellbeing.
8. Sufficient resources should be available, including PPE, equipment, and low risk pesticides, so that the professional spraying teams can effectively operate and risk of pesticide exposure can be avoided. This can for instance be organized through farmers' organisations or unions.
9. Lastly, pesticide container management and recycling[7] should be part of the contract spray service models. Contract spray services should collect and bring empty containers to appropriate collection points, so that the risk for humans and the environment can be minimized.

[6] SSPs can potentially link up to the Plantwise plant clinics. Plantwise (https://www.plantwise.org) is a global programme led by CABI, which works closely with national agricultural advisory services we establish and support sustainable networks of plant clinics, run by trained plant doctors, where farmers can find practical plant health advice. The first plant clinics were launched in Ghana in 2012, in the Ashanti and Brong Ahafo regions. Farmers consulted plant doctors on 14 crops, with around a third of their queries around problems with cocoa and eggplant. Operations have since been scaled up to the country's northern and eastern regions.

[7] CropLife container Management Programme: Since 2010-to date, CropLife Ghana has been implementing the container management program. This is a program where empty pesticide containers are collected from across the country and recycled for non-domestic uses. A pilot program was initiated in the Ejura Sekyere Edumase district of the Ashanti Region in 2010. Over 100 MT of the containers were collected and transported to Cyclus Recycling for recycling into pavement blocks. At the moment, through a collaboration with Wynca Sunshine Agric (a member of CropLife Ghana), empty pesticide containers of Wynca Sunshine are been collected back to the CropLife Ghana TSF for a token fee. So far through this innovation, over 10 MT of pesticide containers of Wynca Sunshine has been collected and been processed at the CropLife TSF by EZOV GH, to be eventually recycled into pesticide container caps for Wynca Sunshine. More awareness programs are being undertaken in this area for the environment to be cleared of hazardous empty pesticide containers (https://www.croplifeghana.org/2017/03/croplife-ghanas-empty-pesticide.html).

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