



Managing Food Security in Light of the COVID-19 Crisis in Nepal

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Abstract

With an aim to explore the possible phasing out of the chemical pesticides from the usages of agricultural purpose in Nepal, a desk review was carried out gleaning through the available literature. The major studies cover the status and usages of chemical pesticides whether it has been an alarming state or it can be used as the least options along with other ecological pest control means. At the same time, the study also tried to accumulate information on the existing policies on pesticide imports and registration along with the existing pest control measures with the use of chemical pesticides to determine judicious or injudicious usages. At the same time, the insight was made on the alternative control measures using botanicals and biopesticides as an alternative to chemical pesticides. Some of the initiatives towards organic production were also reviewed.

The study revealed that Nepal is not a country using a high amount of chemical pesticides while producing agricultural crops. It is very interesting to note that, there is no chemical pesticide manufacturing industry existing in the country, as there are only four pesticides Formulation Company. They import active ingredients (a.i.) of the chemicals mainly from India and a few other countries. It has a robust chemical pesticide registration system through its own organization mechanisms. Very interestingly the national average of chemical pesticides is found as low as 396 a.i./ha which is very insignificant compared to another country. This further indicates that the soil and environment have not deteriorated yet and still large areas of the country do not rely on chemical pesticides. However, the use of chemical pesticides is the foremost choice for farmers in some commercial pockets in cash-generating crops. There are ample programs on the judicious use of chemical pesticides considering the health of the farmers, applicators, and environment. These are often considered indicating ample awareness on the safe use of chemical pesticides. Production and usages of botanicals and biopesticides are in place. *Metarhizium anisopliae*, a fungal biopesticide was produced for the first time in 2009 using indigenous strains. Dozens of biological products are registered and in use however, they are manufactured in abroad situations. The study also explored the possibilities of using agricultural commodities without using chemical pesticides. It was found that one of the provinces among seven in the country, the Karnali Province declared the organic state. Based on the geophysical situation of the country, the use of chemical pesticides has been limited to only in some commercial pockets less than 25% of the country, which is mostly at the flat area leaving mid-hills and high hills. This area consists of a major part of the country, which produces agricultural commodities by default organic in nature since there is less access to chemical pesticides coupled with a low infestation of insect pests and diseases. There is ample scopes of producing crops, vegetables, fruits, and several niche products. In commercial crops, gradual increase in the use of bio and botanical pesticides along with reduced reliance of chemicals needs promoting. For this enhanced coordination along with the governmental and non-governmental agencies is necessary. Food and Agriculture Organization (FAO) of the United Nations has been involving in the capacity building of the national system. In Karnali State FAO is working further, which would be crucial in this endeavor.

Keywords: Agriculture; Chemical Pesticides; Food and Agriculture Organization; Organic Agriculture

Abbreviations: FAW: Fall Armyworm; FAO: Food and Agriculture Organization; USAID: U.S. Agency for International Development; RAP: Regional Agricultural Program; ICRISAT: International Crops Research Institute for the Semi-Arid Tropics; MoALD: Ministry of Agriculture and Livestock Development; NARC: Nepal Agriculture Research Council.

Introduction

Fall Armyworm – A Threat to Food Security

The invasion of the fall armyworm (FAW), a pest native to the tropical and subtropical Americas, is synchronous with the rise COVID-19. FAW was accidentally introduced to Nigeria in 2016, and since then, has spread to all Sub-Saharan African countries. It reached southern India by 2018, most of South and Southeast Asia by 2019, and Australia by 2020. FAW invaded Nepal in May 2019. Estimated to cause maize losses of 21-53 percent, FAW threatens the food of millions. The pest is difficult to eradicate once it establishes as adults can lay up to 2,000 eggs, moths can fly long distances, and the pest feeds at all plant stages. While it mostly affects maize production, FAW is known to infest over 350 plant species. If it would had been inadequately managed, could cause over \$5.5 billion a year in maize losses. The progression of the dreaded FAW pests, the picture in Nepal seems very scary (Image 1).



Image 1: Fall Armyworm.

The Challenge Ahead

The IPM Innovation Lab, funded by the U.S. Agency for International Development (USAID), has established research and extension activities for FAW management in Nepal, Kenya, and Tanzania. Additionally, the Food and Agriculture Organization (FAO), Regional Agricultural Program (RAP) Bangkok has been working closely with the FAO country office and Government of Nepal to plan interventions. However, the outbreak of COVID-19 and government stay-at-home orders delayed activities such as workshops, production of natural enemies to be released against FAW, and field trials.

Farmers are reluctant to take up field operations, as they risk contracting COVID-19 working with others and purchasing necessary supplies. There is also a labor shortage for farmers' fields and limitations in marketing farmer produce. With farmers constrained, food production falters because pests flood in. It isn't just maize that FAW attacks, but numerous crops – rice, sorghum, vegetables – that farmers grow to feed their families. In Africa, maize is a staple food crop, while it is grown throughout Asia for both human consumption and poultry feed. In Nepal, FAW doesn't simply threaten food insecurity, but could lead to a major collapse of existing jobs in the livestock industry. This will have greater impacts on the food and nutrition security.

Management Options are Available

There are numerous options for managing FAW in the developing world. Physical control involves practices such as handpicking caterpillars from a plant. Cultural control can reduce pest incidence through crop rotation, mixed cropping, and other agronomic practices. Mating disruption through the release of pheromones is also a valuable practice for preventing FAW from mating. The Nepal Agricultural Research Council and other institutes can contribute through conventional breeding of crops resistant to FAW as well as adopting resistant crop varieties. Chemical pesticides can be used, as well as numerous bio pesticides. Bio-control, or the release of natural enemies, can offer long-term prevention. To effectively combat FAW, management solutions must be suitable to local conditions. While GMO maize is available, many African and Asian countries do not socially accept the practice. In this case, breeding resistant maize varieties could be an alternative to Nepal. Chemical control is sought after by farmers for quick suppression of the pest; however, regulations on pesticide registration, availability of protective equipment, and safe use are not progressive. Solutions such as physical control are not feasible for large plots of land. Albeit this practice fits well in family managed farming. The IPM Innovation Lab has found that augmentative biocontrol of FAW in Africa and Asia is promising. Two natural enemies that attack the eggs of the pest – *Telenomus remus* and *Trichogramma* – show up to 70 percent parasitism of FAW. Biocontrol demonstrates an environmentally-friendly, economical, culturally-acceptable solution. The two natural enemies are local to both Africa and Asia, and the technique used to mass-multiply and release them is easily transferrable. Solutions such as biopesticides can be used in conjunction with the technique. In collaboration with the International Centre of Insect Physiology and Ecology (*icipe*), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and FAO, the IPM Innovation Lab conducted two training workshops in 2019 for scientists from Asia and Africa on mass production of the natural enemies and also produced a training manual.

Similarly, fungal antagonist *Metarhizium anisopliae* can be mass produced in NARC and DoA, which can be transferred to private sector.

A Way Forward

FAW's economic impact has yet to fully reach Nepal, and neither has the spread of COVID-19. However, a cautious approach is needed to control both. By activating the National Fall Armyworm Working Group led by Ministry of Agriculture and Livestock Development (MoALD), Nepal Agriculture Research Council (NARC), Food and Agriculture Organisation (FAO), USAID, iDE, private sectors, and others, Nepal can protect crops threatened by the merging influx of FAW and COVID-19. Facilitating supplies such as seeds,

fertilizers, pheromones, both bio- and chemical- pesticides, and other inputs to farmers is also crucial to maintaining a vibrant local food production and supply chain during the pandemic. Continued production of natural enemies of fall armyworm, ensuring precautionary measures such as social distancing and wearing masks, is pertinent so that farmers do not lose time in mitigating the spread of the pest in their fields. Existing virtual hubs such as Facebook and WhatsApp that foster networks of farmers interested in IPM and other crop protection services will be helpful in combatting FAW with the latest information available. It is probable that many food-exporting countries will impose restrictions amidst the rise of COVID-19 – hence, locally maintained food production and pest prevention in Nepal could have a major impact in preventing food insecurity.