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AGRICULTURAL MARKETING ADVISORY NOTE

BROWN LOCUST OUTBREAK IN SOUTH AFRICA: WHAT ARE THE IMPLICATIONS FOR AGRICULTURE PRODUCTION AND MARKETING?

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1. INTRODUCTION

The brown locust (*Locustana pardalina)* is a major agricultural pest in much of southern Africa. It has been described as the most important agricultural pest in South Africa (SA) where its main outbreak areas are in the semi-arid Karoo region. The recent brown locust outbreak in the Western Cape, Northern Cape, Eastern Cape and Free State provinces is indicative of the need to find long-lasting measures to control and mitigate against the negative effects inflicted on the livelihoods and agricultural value chains. This advisory note presents the implications of brown locust outbreaks on agriculture production and marketing with special emphasis on the South African context. It further proposes some recommendations on how to reduce effects of the current outbreak and to better prepare for future outbreaks.

2. DESCRIPTION OF BROWN LOCUSTS

Brown locusts are medium-sized insects belonging to monotypic genus Locustana (Todd et al, 2002). They are characterized by classic gregarious behavior with a discontinuous genetic variation resulting in the occurrence of several different forms on crowding. The two known forms of the brown locust include the gregaria or migratory form, which is the larger form with a body length of 41–51 mm, changing colour from yellowish grey to yellow when sexually mature (SANBI, 2020). The solitary form is smaller (solitaria) with a body length of about 26–36 mm. The life cycle of brown locust comprises of five stages, namely: mating, laying, hatching, hopping and adulthood. According to Cheke, et al. (1999) and Todd, et al. (2002), the brown locusts lay eggs on dry soil during summer months and they hatch 10 days after the rain has fallen and the swarming population often lives until another dry season. With its drought-resistant egg stage, short life cycle, high fecundity and a highly gregarious behaviour, the brown locust is categorized among locusts that tend to cause some economic challenge as it produces some intense outbreaks. Despite a long history of research into the dynamics of population variability, there remain no definite predictions sufficiently far in advance to plan anti-locust campaigns. This has resulted in the application of insecticides over large areas during outbreaks of the swarming phase (Nailand & Hanrahan 1993). To date, there is no study in South Africa known to the authors that fully documents the impact or implications of brown locust on agriculture production and marketing, even though their outbreaks started over 200 years ago.

3. IMPLICATIONS OF LOCUST OUTBREAKS

Locusts have been identified as among the oldest migratory pests and among the most devastating pests worldwide (Cheke et al., 1999). Furthermore, brown locusts have been reported to be among the main migratory pests in southern Africa. This is both in terms of the impact on the environment and production of food.

Work by Food and Agriculture Organization (FAO) (2006) and Zhang *et al*. (2019) shows that locusts can lead to 80-100% production losses in cereals, while for leguminous crops, losses in Burkina Faso, Mauritania and Mali ranged between 85% and 90% of the expected production. Animal pastures are also affected by locusts but most damage (85% of production) is reported in fodder and this often results in farmers selling their animals at low prices in order to meet the subsistence needs of households. Beyond the effect of locusts on plants, the use of chemicals to control locust outbreaks is known to cause human and animal health as well as environmental problems.

South Africa's agriculture sector is likely to be highly vulnerable to the effects of the locust outbreak. A study by Peng et al., (2020) found that locust outbreak is associated with global warming and is more prevalent in La Nina years. The study further predicted that the year 2020 could mark the worst outbreak for the past 100 years - more especially when there is an insufficient early warning system in place.

The report by the FAO (2017) indicated that locusts tend to attack all kinds of crops and plants and jeopardize food security and livelihoods. Thus, unintended consequences

of the outbreak could be a potential expansion in food shortages and humanitarian crisis in countries that are already under pressure in terms of poverty and food security

4. INTERVENTION MEASURES

Prior to 20th century, farmers used to spray hopper bands of locusts with soap solution, paraffin oil, cattle dip formulations and sometimes by setting fire to the grass. In other countries, biological control measures were also tried but were not effective given that the locusts would take close to 10 days to die after being treated with biological agents. Biological agents entail the use of micro-organisms, mites, spiders and forestation - to attract birds that prey on the locusts (Peng *et al*., 2020). The methods having proven to be ineffective, many countries including the South African government embarked sponsoring chemical control campaigns in 1906. To date chemicals have been the most effective control measure compare to the aforesaid.

Earlier, the use of insecticides and pesticides to prevent swarming was viewed as an optimal control strategy. But in the recent past, it has been receiving some criticism and it is deemed as harmful to human health, non-targeted organisms and the environment – with some research advocating for the use of green technologies and biological means (Cheke et al., 1999; Peng et al., 2020). Therefore, the management of the locust problem in South Africa should be focused on sustainable agricultural production without affecting biodiversity.

First, this calls for strengthening the capacity of environmental and health professionals through trainings pertaining to the rules and regulations concerning the use of pesticides that target the physiology of the locust while minimizing the harmful effects on the environment of humans.

Second, it is important for South Africa to map out the seasonal breeding areas for the brown locusts. A better understanding of these areas, in line with the breeding cycle of the locusts renders an opportunity of designing and developing measures through which their life cycles may be disenabled.

Third, the identified and mapped out areas must be regularly surveyed and monitored to allow for the control of the locusts early enough before they invade other areas and become difficult to control.

Fourth, there should be an implementable and effective locust control strategy in areas where seasonal breeding occurs. This is bound to reduce the risk of future outbreaks and upsurges, through the timely detection of a pre-emergency situation. Also, the effective implementation of the strategy, is bound to lead minimal crop and pasture losses. Furthermore, the control strategy is bound to considerably limit control costs through intervening at an early stage with limited scale control operations, and allow implementation of safer and environmentally friendlier control measures.

Fifth, within the breeding areas there is a need to involve village/community and phytosanitary brigades in chemical locust control campaigns and also boost their locust monitoring capabilities. This will enable early detection of outbreaks and manage them timely before they spread further.

Sixth, there should be considerable scope for future development of models for the seasonal prediction of brown locust activity in which high-frequency variability is related to climatic indices/conditions.

Lastly, to enable the affected communities cope with the locust outbreaks, relief aid should be extended to such communities that may be in need, depending on the extent of damage caused.

5. CONCLUSION

The outbreak of brown locusts in the Western Cape, Northern Cape, Eastern Cape and Free State Provinces if not attended to early enough, is bound to cause detrimental effect on crops and pastures as well as negatively affect the socio-economic wellbeing of the communities in the affected areas. The pest can cause 80-100% production damage in crops and pastures, hence rendering significant distortion in the volume of produce available for consumption and marketing purposes. Although the chemical control measure has been the most successful means used in many countries and over the years, it has also been greatly criticized due to its detrimental effects on humans, animals and biodiversity in general. It is critical for South Africa to identify and map out the breeding areas of the brown locusts, and then put in place an effective control strategy. An effective control strategy should encompass a budget through which the envisaged activities must be financially facilitated.

6. RECOMMENDATIONS

Based on the possible interventions, we recommend as follows:

- South Africa to map out the seasonal breeding areas of the brown locusts. This will entail engaging experts in this field with a better understanding of the locust's life cycle, breeding behaviour as well as the geography of the affected and/or the surrounding provinces in question. **Responsible institution**: DALRRD, ARC, SANBI, DEFF and Agro-chemical industry.
- The country should develop/design an implementable and effective locust control strategy largely informed by the locusts' breading areas and breeding seasons. The strategy must for instance include: the capacity building aspect for village/community and phytosanitary brigades, relief aid for adversely affected communities, capacity building for environmental and health professionals. **Responsible institution**: DALRRD, SANBI, and DEFF.
- In the short-run, there is a need to used chemical control measures to contain the locust before they get into the next egg laying cycle. **Responsible institution**: Agro-chemical industry, SANBI, Agriculture industries and DALRRD

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