

IMPORTANCE OF COMMUNITY ENGAGEMENT IN CONTROLLING *BACTROCERA DORSALIS*

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ABSTRACT

Community engagement is an important function in managing fruit flies in agricultural areas. It seeks and facilitates the involvement of all people potentially affected by, or interested in, the outcome. The propensity of government, industry and community to engage ensures that there is shared responsibility in attempted approaches to reduce the incidence and spread of fruit flies. A system that allows shared responsibility eases the constraints on resources. It also allows dissemination of information about the pest to a wider audience, and reduces misconceptions about the use of products for fruit fly management. Community engagement requires knowledge of the cultural background of all people involved to ensure optimal outcomes. In the campaign following the introduction of *Bactrocera dorsalis* into South Africa in 2010, a wide-scale media approach was used by government to disseminate information and engage communities on key aspects of its control, which included radio adverts and interviews, WhatsApp mobile messages, information brochures, education of school children from affected areas on the threat of *B. dorsalis*, and organization of workshops. Some communities appeared to be ignorant of the problem, as they discarded information pamphlets without reading them, but other reasons could have played a role. Challenges were also encountered in getting farmers and communities to apply proper orchard and vineyard sanitation measures, and to make use of the fruit fly control products provided for fruit fly management.

Keywords: Fruit flies, management, community engagement, information dissemination, misconceptions

INTRODUCTION

The survey protocol for exotic fruitfly control, particular interest to *Bactrocera dorsalis* in South Africa was launched from 2006. It has since been a regular program, in place throughout every year to detect any incursions from high risk areas such as border posts, harbours and airports

with the objection to reduce the pest population within the affected area. Monitoring surveillance continues together with detection surveys for other exotic fruit flies such as *B. zonata*, *B. cucurbitae* and *B. latifrons* on a once a month surveillance action. Based on the inflict of damage this pest poses on the agricultural industry, there has been a system in place to protect the export markets by ensuring that all producers follow the trapping guidelines to ensure that *B. dorsalis* is detected early in production areas with known hosts in particular cities/towns/villages. According to the South African action plan for the control of *B. dorsalis* members of the public form an important domain as role players due to how they influence the success of actions presented to them (DAFF,2014). Management actions are necessary in areas where *B. dorsalis* are present to lower population numbers, to minimize natural dispersion and to increase crop productivity. In the campaign following the introduction of *B. dorsalis* into South Africa in 2010, a wide-scale media approach was used by government to disseminate information and engage communities on key aspects of its control.

The National Plant Protection Organisation of South Africa (NPPOZA) positioned within the Department of Agriculture, Forestry and Fisheries (DAFF) functions to manage a regulatory system that focuses on reducing plant pest risk by following a recommended response for survey (regularly assess the quality of the materials used, servicing, placement, sample collection and dispatch, identification and reviewing the effectiveness of the use of these materials and trapping procedures), containment and eradication. The phytosanitary measures for the control and management of *B. dorsalis* is controlled according to R110 of the Agricultural Pests Act, 1983 (Act No. 36 of 1983) or the APA. Fruit movement out of *B. dorsalis* affected areas would only be allowed following implementation of the basic phytosanitary measures within the affected areas as part of the eradication/control measures. The NPPOZA plays a crucial part in making sure that management measures are implemented in such areas after consultation with local producer's industry members of the local community. This is a systems approach that needs to be followed to obtain the best possible results. The NPPOZA ensures that a range of activities including biosecurity are prioritized. They liaise with industries and affected communities on management initiatives and emergency responses. Through such practices producers are further encouraged to implement good biosecurity practices to protect their crops as negligence can pose negative impact to the wide area e.g. other provinces (DAFF,2014).

Community engagement is based on the participating process, media and interpersonal communication which facilitate a dialogue among different stakeholders around a common development goal, with the objective of implementing a set of activities to contribute to its realization (Bessette, 2006). Communication plays a huge role on informing all targeted audience about any developments related to phytosanitary issues and to improve public participation on measures to reduce pest population. Community engagement is recognized as one of the critical

factors to the success of the above mentioned strategies, particularly where community members play a direct role e.g. where sanitation should be applied in home backyards (Arevalo-Vigne *et al.*, 2015). Based on the South African Emergency Plant Pest Response Plan (SAEPPRP) which outlines the effective rapid response to the detection, identification and mitigation of an emergency plant pest incursion. The importance of timely communication between local, national and international government agencies, academia, and plant industry professionals to prevent the establishment and spread of such a pest is outlined as one of the crucial factors both execution and control, to facilitate communication among stakeholders and to help achieve quality in deliverables (DAFF, 2014).

In brief, by engaging community members the applicability of several programs becomes more viable and the capacity of response is met. Literature indicates the level of commitment in some individuals can be related to various psychological and socio economic factors therefore it is important that how the new information could facilitate change (Shepherd, 2012). Communication not only increases awareness amongst people and influence people's behavior but it assists the public to pursue the management strategies and disseminate correct information regarding pest management (Arevalo-Vigne *et al.*, 2015).

Phytosanitary measures in areas where specimens were detected

DAFF determined which phytosanitary measures should be applicable to establish areas within 5km radius from the affected area, placed under quarantine. An official order according to Section 7 of the APA and to R110 had been issued to all land users within the affected areas. This is part of an area wide management initiative for an effective control of fruit flies. All users of land are liable to comply with the provisions of such an official order. This includes fruit for small scale vendors (e.g. bakkie trade), vendors and fruit stalls travelers, friends and family. Residents were informed to refrain from moving host material from quarantine to non quarantine areas. This meant they had to stop giving fruit to visitors, relatives and friends from pest infested areas. Affected small scale produce markets or producers had to be compliant with the permit conditions. Any land user or person who intends to move host material of *B. dorsalis*, from an infested area into a pest free area must apply for a permit to do so. A farmer had to apply for a removal permit from DAFF if granted, a farmer needed to provide a copy to the buyer of host fruit (hawkers) and had to make sure that the valid period for the permit has not elapsed. The permit is for free.

Inspection for the purpose of issuance of a removal permit is conducted on request and payable according to prescribed tariffs. Such a permit would require phytosanitary conditions. The producer can procure registered agricultural chemicals to control this pest such as, MAT blocks, GF120 and M3 bait stations to keep the fruit fly numbers under control to avoid infestation of

fruit and fruit production losses. Such an area may require a surrounding buffer zone with low pest prevalence (LPP) which would also be under official control. However basic phytosanitary measures should be followed as cultural control methods such as orchard and field sanitation (DAFF, 2014).

Arevalo-Vigne *et al.*, (2015) outlined that fruitflies are an important insect pest that globally attacks a wide range of fruit and vegetables with a significant implications for market access. The prevalence of uncontrolled fruitflies with particular attention to backyards (households) and local orchards can be a significant source of fruitfly population that poses a risk of spread to fruit production areas.

a) The field sanitation method

Fruit collected as part of the sanitation program can be placed into plastic black bags and left in the sun at the end of each row. The same principle should also apply for fruit waste at hawker stands; fruit stalls small fresh produce markets and green grocer shop outlets. After four weeks decomposing fruit inside bags can be removed and either is buried, shredded or used for composting. The NPPOZA plays a role in ensuring that plastic bags are issued to all road stall vendors in affected areas to encourage all waste fruit to be placed and sealed off. Another procedure for fruit sanitation include burying and covering with a top layer of soil or sieved compost from the previous season of at least 0.5 m or heaped on top of the soil and covered with a top layer of soil or sieved compost of at least 0.5 m. No buried fruit may be uncovered for at least five weeks after being covered. Soil drenching was also encouraged where the shredded pulp is spread between rows and left into the sun to dry. The top of the heap must be sprayed on a weekly basis along with an area of one meter surrounding the heap. Additionally a layer of lime can be added to cover the waste before it is covered by soil or sieved compost.

b) Chemical control method

Bait sprays either GF 120 or a mixture of HymLure and Malathion, or supplemented by M3 bait stations may be used as preventative measures in affected areas to protect undeveloped fruit or fruit not yet suitable for oviposition by fruit flies. All fields and orchards producing host material in the quarantine area must have MAT blocks set out at a ratio of at least 400 per km² or 4 per hectare in street blocks at a ratio of one every 50 m if access to host trees in private gardens are not obtained or unfeasible. M3 bait stations can be applied at a ratio of one per tree in each street of each street block if access to host trees is not feasible or at a ratio of one per host tree if access to trees is available.

c) Supplementation methods on cargo

Trucks must be sealed and covered by plastic sheeting plus brown paper and nets and/or tarpaulin and boxes must be sealed in such a way that fruit cannot fall from the truck during transport, covered in such a way that no adult fruit fly which may have entered the pack house and consignment during packing can escape during transport or be could easily be removed by people or baboons.

This study seeks to explore the impact of communication means in managing fruitflies and also evaluates the public's attitude towards adhering to policies and regulations relating to phytosanitary matters. Research has powerfully illustrated that a lack of knowledge in domains such as environmental issues can lead to bad decisions and erroneous beliefs that hinder a society's ability to create change in domains that require it (Shepherd, 2012). A considerable amount of research, however, suggests that people often engage in more psychologically defensive, and less work intensive, processes when confronted with uncertainty (Hogg, 2007; Kruglanski & Webster, 1996; McGregor *et al.*, 2010).

METHODOLOGY

The action plan for *B. dorsalis* was developed by the South African *B. dorsalis* Steering Committee which consisted of DAFF officials under Directorate Plant Health, Directorate: Inspection Services, Directorate Food Import and Export Standards) and representatives from each of the major affected industries (e.g. Citrus, deciduous fruits and subtropical fruits), a representative of fresh fruit exporters and a representative of fruit processors. The action plan took the principles of the International Plant Protection Convention (IPPC) and the relevant International Standards for Phytosanitary Measures (ISPM's) into consideration. According to the action plan the *B. dorsalis* Steering Committee worked to oversee the implementation of surveillance, communication, coordination of actions and decision making in response to *B. dorsalis* detections. Notifications to the international community was done in consultation with the Steering Committee and in accordance with the requirements of the World Trade Organization Agreement on Sanitary and Phytosanitary Measures (WTO SPS Agreement), the IPPC and relevant ISPMs, with which the national phytosanitary standard and operating procedures for pest reporting are aligned. The NPPOZA shared information on fruit fly control and surveillance activities through bilateral meetings with other neighbouring countries in the SADC region so that the outcomes of the treatment can be effective. They used international portals to provide maps and media releases to inform of the pest status in various parts of the country.

Members of the provincial department of agriculture affected or at high risk of being affected by the fruitfly had to be co-opted if a need arise, to ensure understanding of the control measures and to increase manpower through implementation. Various workshops and meetings took place

to inform community members about the pest, the actions that had to be undertaken but also to address their concerns. There was a series of community meetings and workshops designed for various audience e.g. tribal authorities where different interactive practices had to be observed. For this study informal conversations provided a lot of information and helped to understand major concerns relating to fruitfly control.

Given the large scale of people that had to be reached, other mediums of communications had to be utilized such as radio adverts and interviews, WhatsApp mobile messages, information brochures, education of school children from affected areas on the threat of *B. dorsalis*, and organization of workshops. The brochures and pest leaflets were filled with pictures of the pest, the effect on produce and lifecycle. This was done to promote science communication and to explain concepts that inspire people to see the need to be involved. Cognition and ability to pay attention create a visual working memory that allows people to recognise familiar objects (Keogh & Pearson, 2011). The means of communication worked to also sensitize small scale produce markets (e.g. bakkie trade, hawkers/vendors and fruit stalls), travelers, residents and producers on phytosanitary issues and compliance to regulations. A preliminary research technique was used to explore people's ideas and attitudes. Furthermore the study focused its techniques mainly on responses from the community engagements on 3 infested provinces: Limpopo, Mpumalanga and KwaZulu Natal. In this study, connecting patterns of cause and effect over time from the qualitative research were explored and triangulation was applied through a series of community meetings and workshops, styled on a focus group. Importantly, the findings presented here should not be seen as isolated research activities, but as a body of interconnected data developed over time using iterative processes and then contextualized, triangulated and crosschecked through all conversational outputs. Therefore even though valuable the information has questionable validity because it is highly subjective and might not be the representative of the population.

Word repetitions and recurring themes display relationships among ideas or concepts on individual concepts pertaining a certain subject. Sometimes the issues affecting the community cannot be only assessed based entirely on numbers, which in most cases yield valuable information however won't describe relationships effectively on why and how certain things take place. It is widely established that qualitative research methods are the most appropriate for assessing the views of a population. Therefore the current author is of the belief that the qualitative method was the best for this study as people's motives, opinions and feelings can be known. This familiarizes the author with how people react when they find themselves exposed to an unfamiliar or rather unknowledgeable concerning a specific domain.

RESULTS

The results were based on observations and conversations with various participants on their knowledge and applicability of control measures.

Strengths

Most *B. dorsalis* incursions were high in production areas and border posts there are minor incursions reported close to the airports. There was good attendance on various workshops held in various provinces that helped to harmonize the procedures linked to the control of *B.dorsalis*. Among those included coordinating workshops between local municipalities, extension officers and tribal councils to further educate people about the pest and their role to keep population numbers low. The NPPOZA also girded on training its provincial personnel on phytosanitary issues. There was good response from community members on the applicability of workshops and media pertaining to pest identification. A number of community members would bring in the specimens they suspected to be *B.dorsalis*. That was interesting to note as it showed the viability of communication and knowledge of relevant bodies who can quickly assist to curb pest incursions and keep pest population low.

The brochures were accurate, simple and easy to read to allow everyone to understand and effectively engage in fruitfly control. Household visits were done and this assisted greatly on facilitating understanding, on measures to reduce fruitfly populations. Some people would be clueless on the subject of fruitflies which suggested that, some community members simply did not read the printed material presented to them. One of the factors to this is, illiteracy and that's where radio announcements were of crucial help as most of the information sessions were done in the community's mother tongue.

The farmers who had a high number of host plants were more engaged in the applicability of control strategies (e.g. sanitation, spraying and hanging of chemicals). A number of farmers would do prompt harvesting and joined hands in spraying their neighboring orchards particularly those who were issued with an order. Some of the farmers provided storage for the NPPOZA leading to the proper implementation of the contingency plan. The trapping information by farmers in production areas was provided to the NPPOZA for each export season. The NPPOZA kept up with the principles of IPPC by being transparent on reporting the status of *B. dorsalis* in various parts of the country.

Weaknesses

Certain farmers would not use chemicals provided by the NPPOZA, where in most cases chemical use demonstrations had been done. Emptying of trapping buckets was also notable in

some of the farms as the area wide findings would not correspond with some of the findings e.g. where host material exists but zero flies opposed to neighboring farms where high pest populations are found. Not everyone complied to apply sanitation in their orchards and households but regular checkups with community members and farmers helped to ensure that everyone was aware of severe impacts of not following proper measures and how it could affect trade, this was inappropriate as moving plant material from quarantine areas to non quarantine area without a valid order to do so is illegal.

Various misconceptions arose on use of trapping buckets hanging on trees along the main roads in various parts of the provinces. Some people associated those with witchcraft and bad luck leading to a number of car accidents in the area. Inconsistent efforts were observed in some vendors (fruit stalls) that made use of plastics provided to them by government but not bought at their own disposal. The survey also took place in winter even though numbers were reduced compared to the summer season. Furthermore control measures were implemented in all seasons given the lifecycle of this pest. There were also variable concerns about the potential risks associated with the use of chemicals on people's health and in the environment.

DISCUSSION

The reduced number of incursions in airports could mean that flight passengers are aware of regulations and few number of people attempt to bring host plant material illegally into the country from other infested countries. However the availability of host material, climatic conditions and terrain could also be non conducive for a fly to thrive in certain parts of the country.

The current author noted that it's crucial that the engagement strategy is sensitive to local needs, expectations, knowledge and concerns. The communication materials e.g. information pamphlets, brochures had to be comprehensible, tailored specifically to the particular community taking into consideration the mother tongue or a language of the immediate community. This attributed to more community members supporting the program and encouraged people to share knowledge with those they engage with. In most cases presentations for workshops held needed to be translated in a language that was known by a particular community. This concurs with findings of Arevalo-Vigne *et al.*, (2015) who stipulates that direct language is necessary in addressing issues that people do not understand and allows dialogue channels which can help solve problems regarding fruitfly control.

Literature largely agrees that poor cooperation between commercial fruit growers and the public requires an increase of the uptake of adoption of control techniques by industry and community (Arevalo-Vigne *et al.*, 2015; Vilas-Ghiso & Liverman, 2007). There appears to be a discrepancy

between the importance/self-relevance of social issues and people's willingness to engage with and learn about them. Leveraging the literature on system justification theory (Jost & Banaji, 1994), the authors hypothesized that, rather than motivating an increased search for information, a lack of knowledge about a specific sociopolitical issue will (a) foster feelings of dependence on the government, which will (b) increase system justification and government trust, which will (c) increase desires to avoid learning about the relevant issue when information is negative or when information valence is unknown. Local assistance in this study led to the successful implementation to the program and a number of farmers cooperated due to fear of yield losses. However fruit vendors were not yet in the regimen of ensuring that fruit is properly disposed, which eventually leads to a pest lifecycle continuation.

This study indicated the extent to which people desire to avoid potentially disconfirming information in other words the complexity of motivated avoidance. If perceived domain complexity leads people to feel dependent on the government thus increasing their investment in seeing the government as capable and competent then it follows that people may be motivated to protect this comforting view from potentially conflicting information (Shepherd, 2012). In contrast, when an issue is seen as rather simple and comprehensible, then these dependence-related concerns should be less prevalent to avoid potentially threatening information. This could be why some people avoided reading the pamphlets or limited their need to be involved to avoid potentially troubling information moreover other people depend on the government to protect them from threat. It is therefore important that an important issue is presented to people in a way that they understand their roles and responsibilities for the best practice that links to current export systems for domestic and international trade.

CONCLUSION

The outcomes of the study indicate the importance of having an effective communication system in fostering community participation; motivating people to identify and solve problems that affect them. Collaborative efforts affect the end results therefore if knowledge is constantly disseminated there's less misgivings and misunderstandings. In essence people were more actively involved in fruitfly control due to their understanding of the common identified problem and the negative impact it laid to their yield. There's still a gap for research and development outcomes on new cost effective treatment and control options on export systems for domestic and international trade.

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