Three areas in South Africa were selected for monitoring the oriental fruit fly (*Bactrocera dorsalis*) populations in order to validate surveillance systems. Nelspruit (Crocodile Valley) and Schoemanskloof (Joubert & Seuns) are citrus producing regions where *B. dorsalis* populations are established, with large populations. These two areas served as a reference to the dynamics of this fly in Southern Africa. Ermelo-Davos is a heterogeneous extensive region constituted by a town (Ermelo), with home-gardens and dispersed hosts in parks and gardens, large pasture areas and a few abandoned and commercial apple orchards. *Bactrocera dorsalis* has been intercepted in the past, and it is suspected that the fly is expanding to this region, which was considered in the border of *B. dorsalis* southern expansion in Africa.

During the first two years of the project, the characterization of the pilot sites was conducted. Orthophotos of each site were obtained from the Department of Rural Development and Land Reform, South Africa. Each site was divided into polygons. For each polygon, the land use, crop and susceptibility to *B. dorsalis* (level and time) were described. Regarding trapping systems, each site was divided into a grid of squares of 1 km x 1 km. The two trapping systems were placed at random within a grid. In Crocodile Valley, a total of 20 traps (10 Lynfield traps baited with methyl eugenol and 10 Bucket traps baited with Biolure) were placed, two traps in each of 10 grids. In Schoemanskloof, 20 traps (10 Lynfield traps baited with methyl eugenol and 10 Bucket traps baited with Biolure) were placed, two traps in each of 10 grids. In Ermelo-Davel, a total of 22 traps (11 Lynfield traps baited with methyl eugenol and 11 Bucket traps baited with Biolure) were placed in 11 out of 28 grids since some grids were unsuitable for trapping due to lack of potential *B. dorsalis* host trees and secure placement sites. Trapping was initiated in all areas in October 2020 and were checked fortnightly. Flies captured were collected in vials and brought back to Citrus Research International, Nelspruit for identification of *B. dorsalis*. Male and female *B. dorsalis* identified in each trap, each month, were counted and recorded. Attractants and dichlorvos strips were changed every two months.

During 2021-2022 (Southern Hemisphere Spring-Summer-Fall) three guided detection trapping strategies incorporating e-traps: risk-guided, effort-guided and space-guided were tested separately in the three pilot sites, in order to contrast the ability of E-traps to provide early-warnings on the presence of *B. dorsalis*. Algorithms were developed to determine deployment patterns of e-traps in each site. The number of e-traps used in each site varied between 6 and 9 depending on strategies. In the risk-guided strategy, the land use and land cover of each grid were ranked from highest risk to lowest risk. E-traps were deployed in sites of highest risk. In the effort-guided strategy, e-traps were deployed to cover the entire site and were limited on effort possibilities (number of e-traps available). In the effort-guided, risks of each grid were secondary considerations. In the space-guided strategy, e-traps were deployed to cover the entire site with minimal distances set between e-traps. The e-trap used was baited with Invader lure which contains 15 g of ME per dispenser. Captures of B. dorsalis in e-traps deployed in guided strategies were compared to those in conventional ME traps in the pilot sites.

During 2022-23 and 2023-24 seasons, the performance of the three tactics was investigated to provide early-warnings of *B. dorsalis* in two of the locations in South Africa, Schoemanskloof and Ermelo town.

Results: Fly counts in each grid and in each site were transformed to flies per trap per day (number of flies in a trap over the number of trapping days). Temporal profiles of the *B. dorsalis* populations captured at each site were constructed.

During 2020-2021: Fly catches were, as expected, lower in the higher altitude areas. In the area at the highest altitude, there were zero catches of *B. dorsalis* males in methyl eugenol baited traps for two consecutive months after the first trap placement in October 2020. The first capture occurred in mid-summer in January 2021 and catches were continuously recorded until Autumn (May 2021). There were no captures again at the start of winter in June 2021. A lag of one month was observed in the peak of captures between the pilot sites. The site with the latest peak of captures was in the site at the highest altitude indicating slower *B. dorsalis* population build up with decreasing temperature.

During 2021-2022: In the area at the highest altitude, there were zero catches of *B. dorsalis* males in methyl eugenol baited traps for six consecutive months between July and December 2021. The first male capture occurred in January 2022 and catches were continuously recorded until June 2022. In the site at the highest altitude and lowest *B. dorsalis* prevalence, the peak of male captures occurred a month after peak of captures in the other sites.

When conventional and guided trapping systems were compared, first detections of *B. dorsalis* occurred at similar times in both systems. Capture rates (flies per trap per day) were however higher in the conventional trapping systems compared to all guided systems. Patterns of *B. dorsalis* male catches were similar in both the conventional and guided detection trapping systems.

During 2022-2023: First captures in Schoemanskloof were observed on January 10 in the Risk tactic, while in the Effort and Space-Distance tactic first captures were observed two weeks afterwards, when traps were again serviced. The E-traps did not detect any fly during the entire season. Total captures in Schoemanskloof were larger in the Risk and Effort tactics than in the Space-Distance tactic (probably due to the larger number of traps in these tactics). In Ermelo town, first capture was observed in one of the E-traps used for the here tactics on January 10. First captures in the conventional traps were detected during the service date of January 27, 2023.