CREATION OF MANGO PEST FREE AREAS AGAINST FRUIT FLY, *Batrocera Dorsalis:* A KENYAN CASE STUDY

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Outline

- Mango production statistics: Kenya Versus the rest of the world
- Outbreak of *Bactrocera dorsalis* (*invadens*)
- Impact of BI of trade
- Initiatives to Pest Free areas
- Lessons learnt
- Conclusion and Way forward

Mango production in Kenya

- Mango is the second most important fruit in Kenya after banana.
- Mango is produced in as over 50,550 Ha where a total of 705,195 Metric tons, valued at Kshs11.71 billion was produced in 2017.
- In Kenya Makueni, Machakos, Kilifi and Kwale are the leading counties in Mangoes production counting for 28.2, 21.5, 15.0 and 7.7 %
- The main variety exported is apple contributing about 70%. Other varieties exported include ngowe, tommy, kent, boribo
- Main export countries include the UAE (> 30% of total mango exported) Bahrain, Saudi Arabia, Netherlands (processed mango only), Qatar, Kuwait, Jordan and , Norway

Worldwide production of Mangoes

- Mangoes constitute approx. 50% of all tropical fruits produced worldwide.
- India accounts for almost half of the world production of mangos, followed by China, Mexico and Thailand.
- Kenya is ranked 13th in the entire world in mango production.
- The USA and the EU accounted for 75 percent of world mango imports.

The fruit fly challenge in Kenya

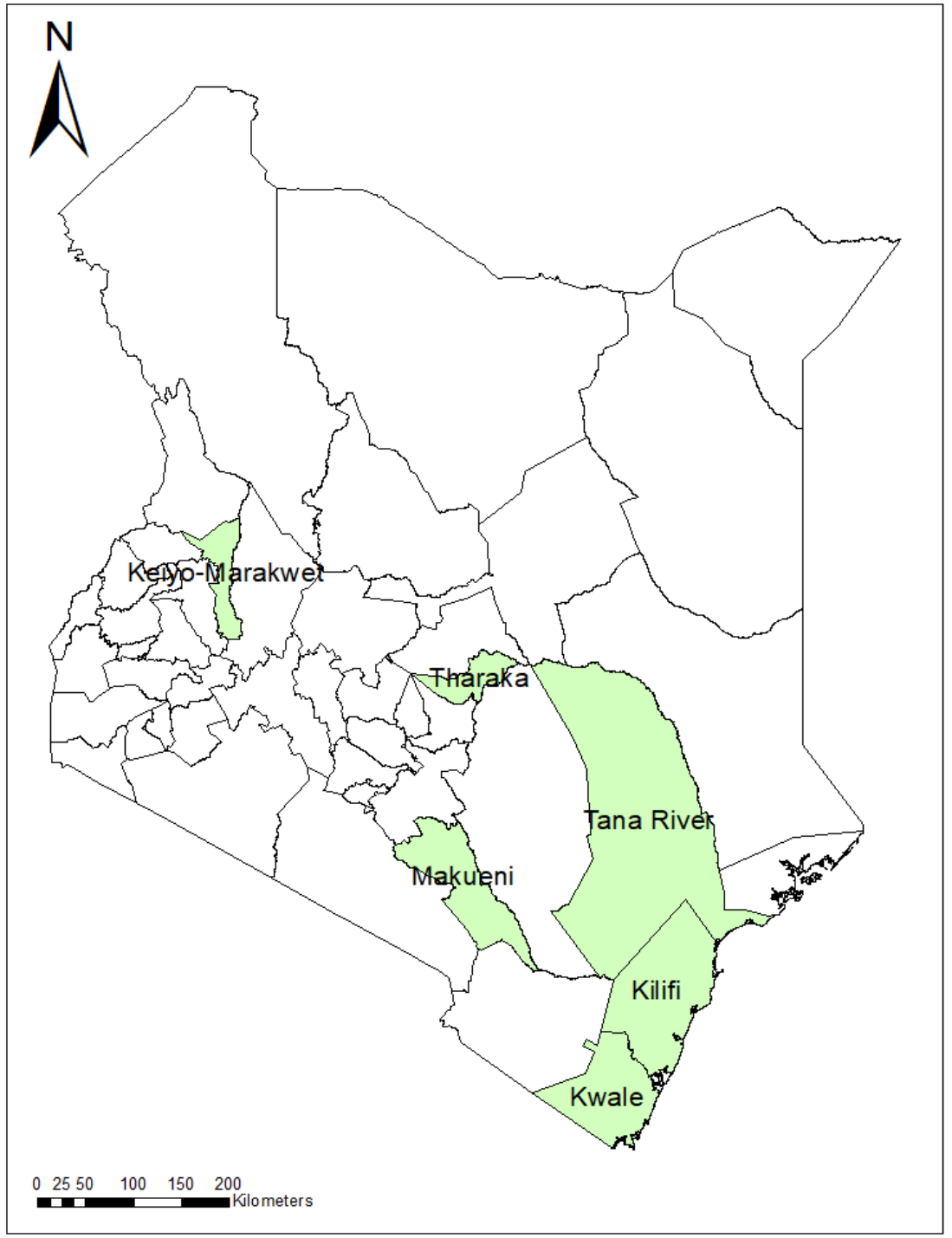
- *Bactrocera (invadens) dorsalis was first reported in Kenya in 2003 (Lux et al 2003)*
- Upon introduction, it spread fast to most part of the country and to several African countries
- Reported to cause severe damage in mango production- up to 85 % reported
- Has affected export due to quarantine restrictions in **lucrative markets such as the EU and USA**

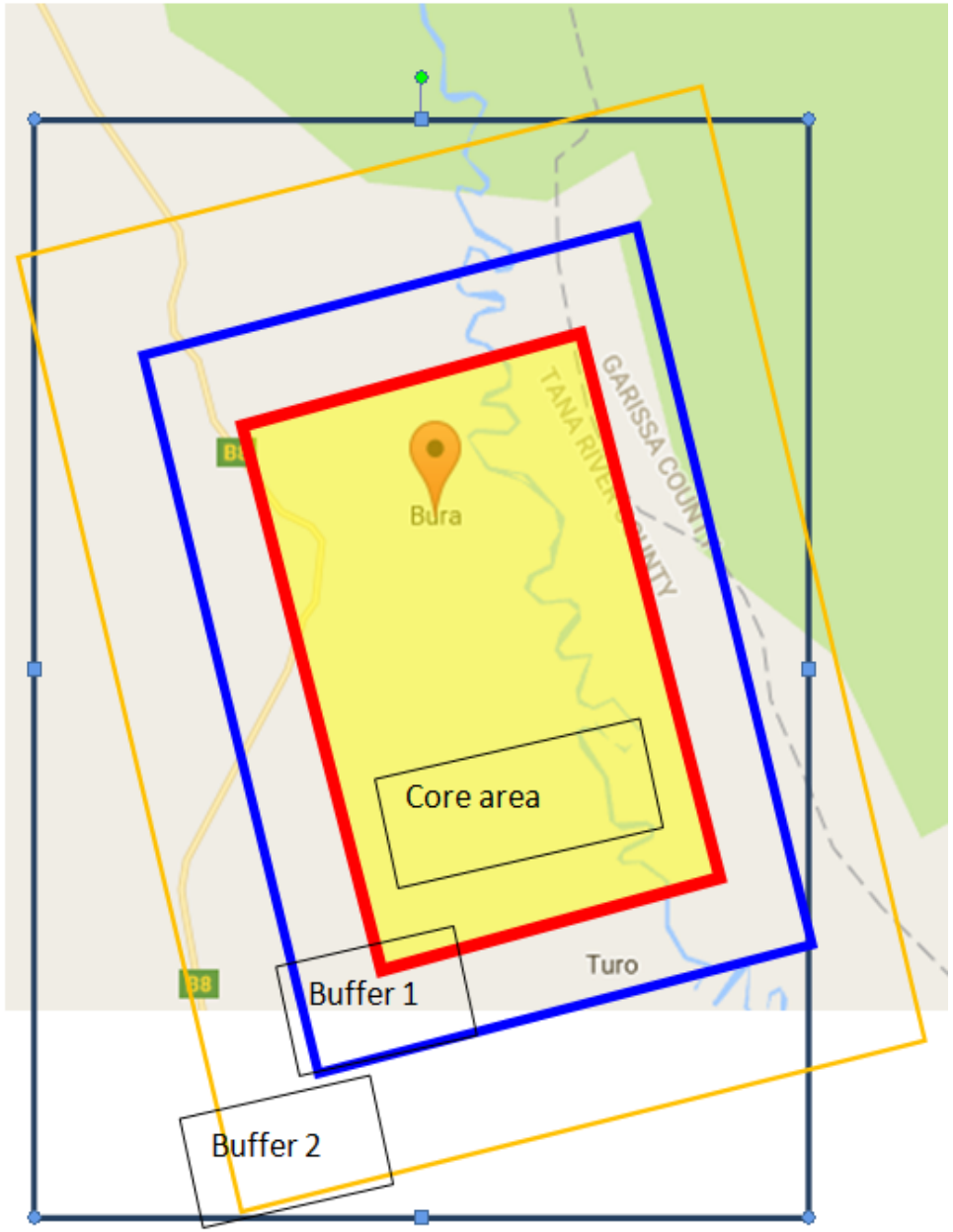
Interceptions of mango & momodica in 2014 due to fruit flies (self ban from August)

Month	Interception in Mango	Interception in mormodica
Jan	1	3
Feb	1	6
Mar	1	3
Apr	0	5
May	3	9
June	5	6
July	-	2
Aug	-	1
Sept	-	1
Oct	-	-
Nov	-	-
Dec	-	1

Establishment of fruitfly Pest Free Areas

- Six counties of been targeted:
  - **Makueni,**
  - **Elgeiyo-Marakwet,**
  - **Tharaka Nithi,**
  - **Tana River,**
  - **Kwale and**
  - **Kilifi Counties**
- These are the major mango production areas



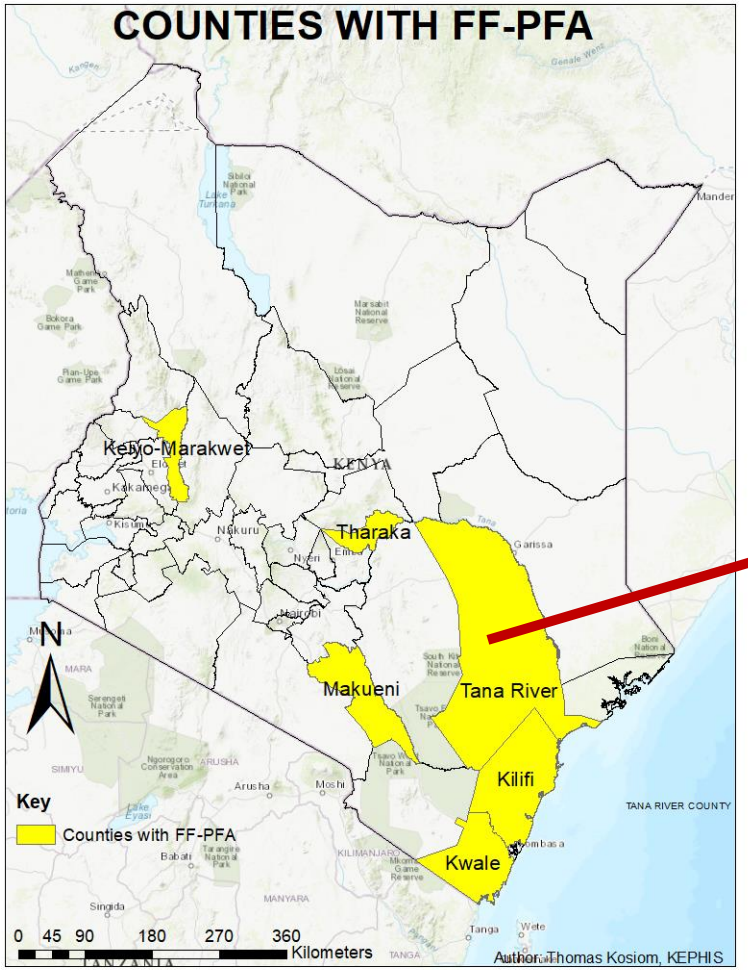


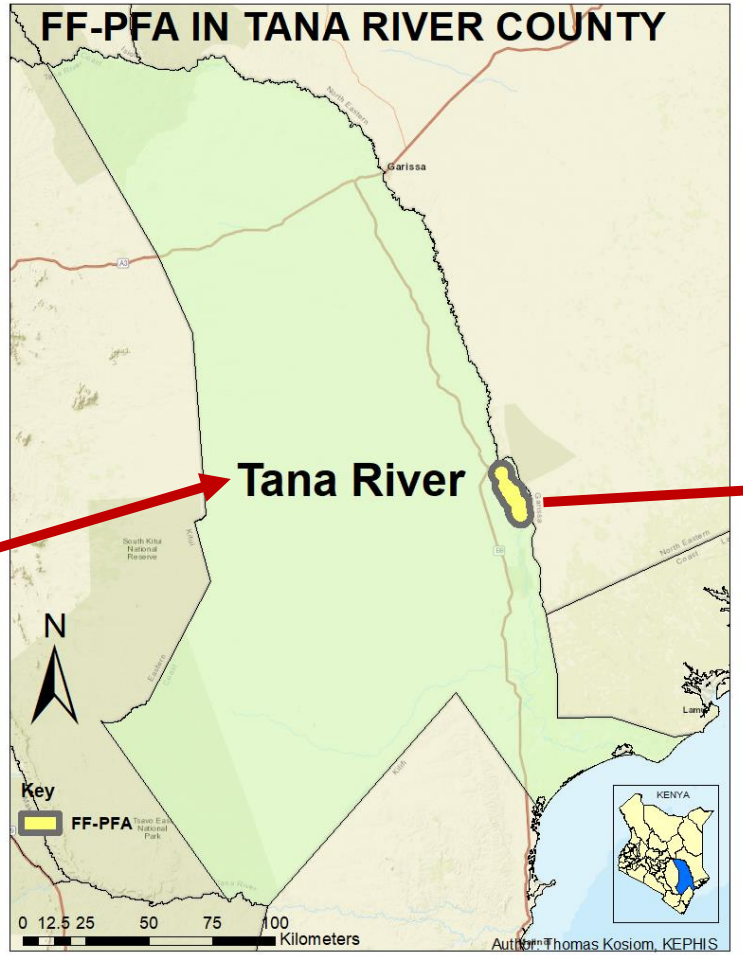
Tana river mango pest free area site

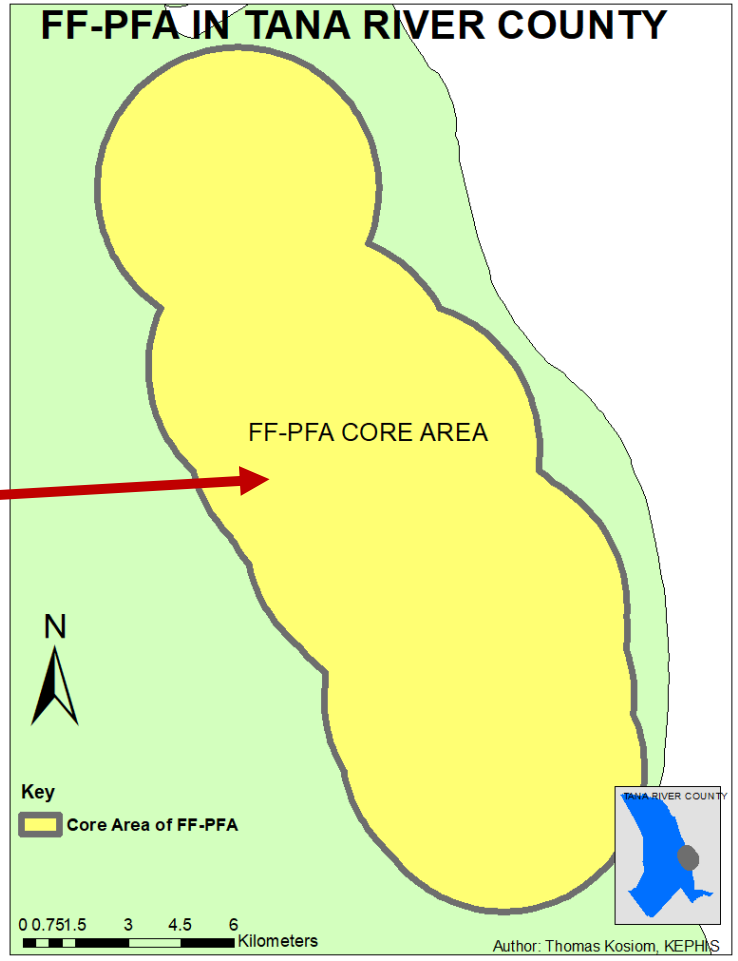
PFA CREATION PROCEDURE

1. Creating awareness to stakeholders and farmers on the importance of creation of pest free area
2. Training extension staff, stakeholder, farmers and KEPHISE of setting traps and data collection
3. Establishing the core area, buffer 1 and buffer 3
4. Monitoring the population of fruit flies in the 3 zones

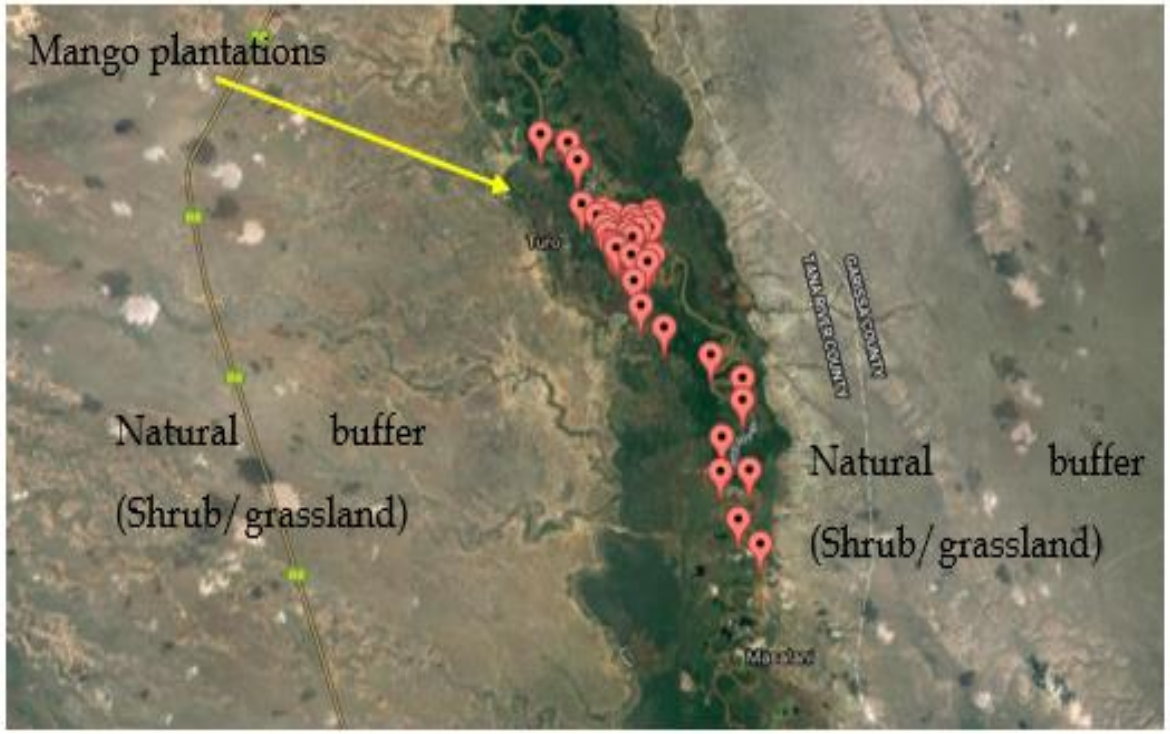
Creation of pest free areas in Kenya



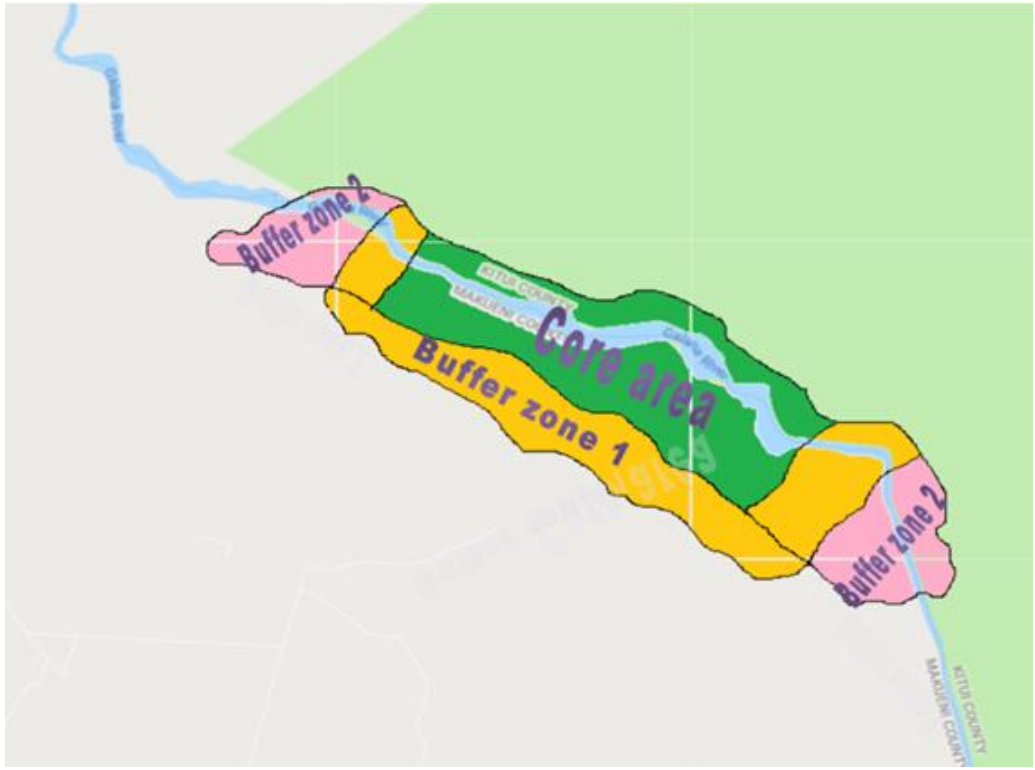




Examples of FF-PFA

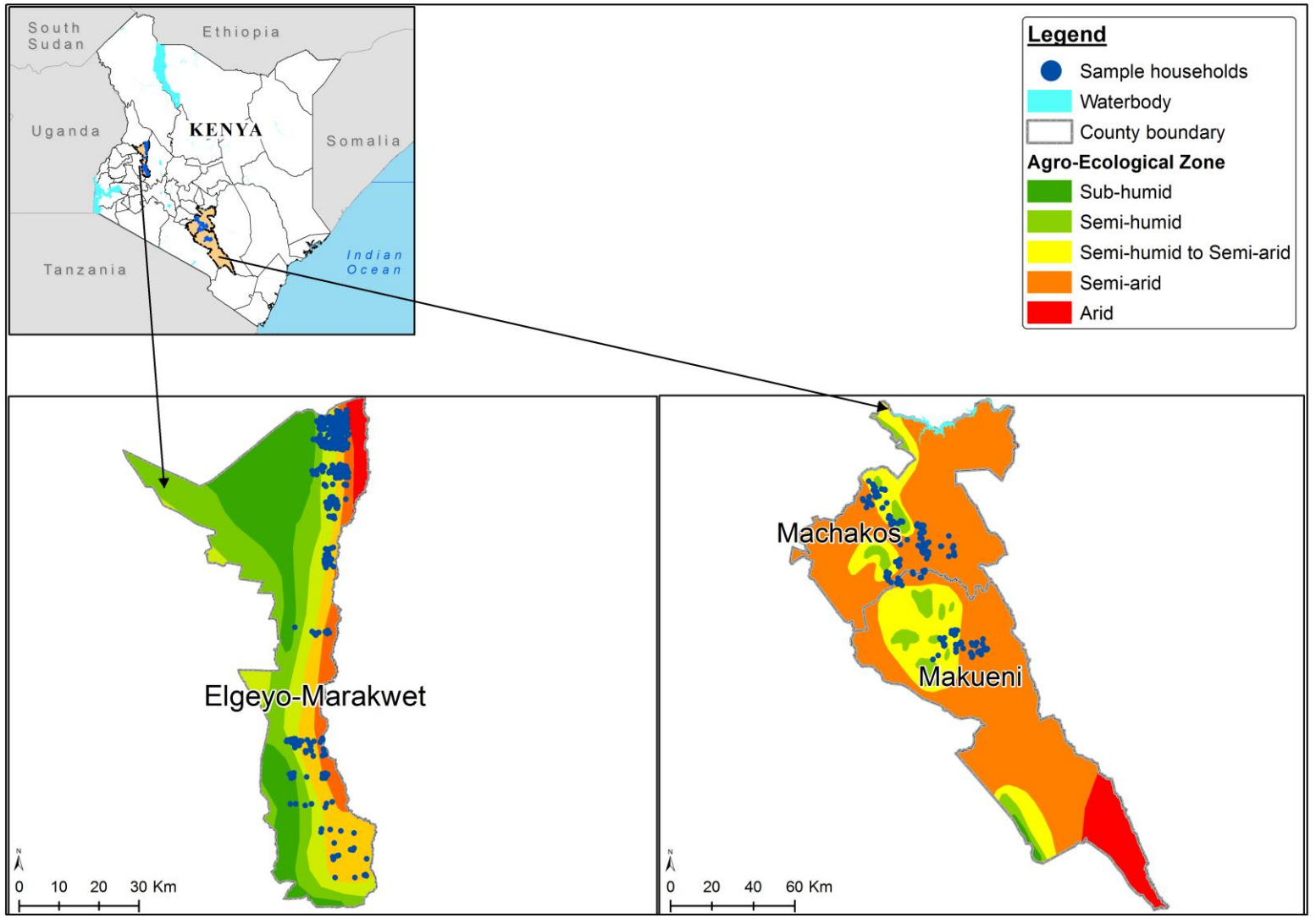


FF-PFA in Tana River County

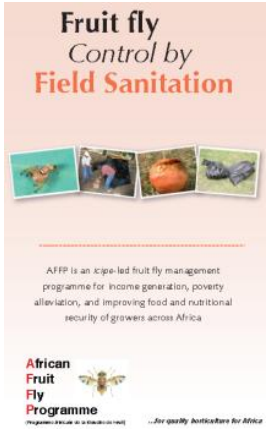


FF-PFA in Makueni County

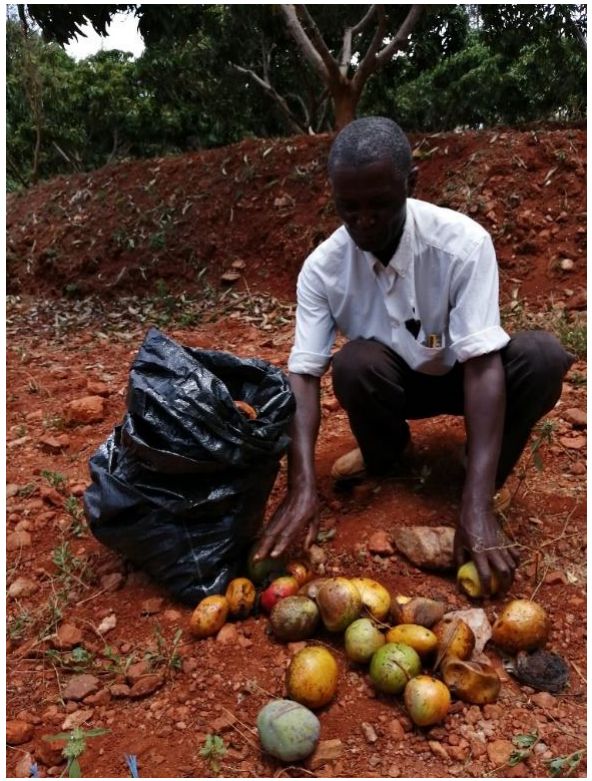
Other FF-PFA sites in Kenya



Awareness campaign in FF-PFA Tana River



Awareness campaign in FF-PFA Tana River



Farmers trained on replenishment of traps and sanitation deployment

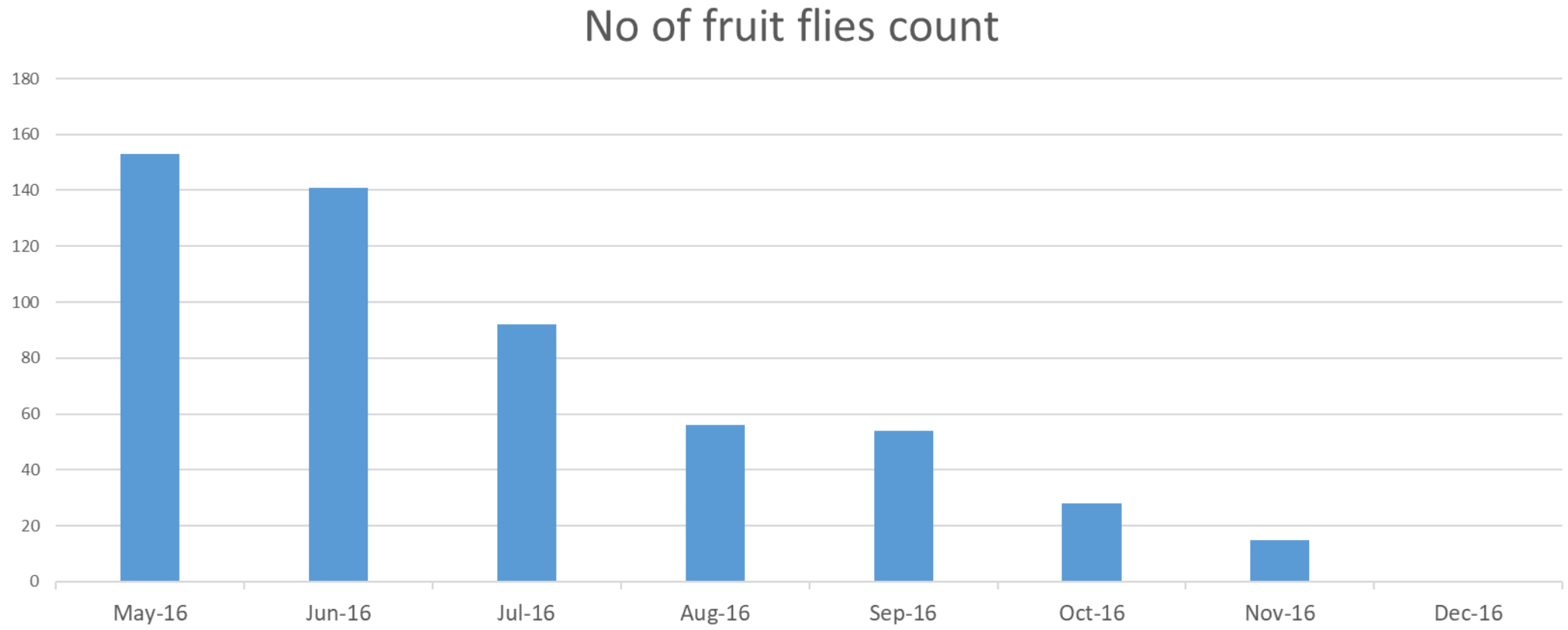
Awareness drives for local leaders (Governor)

Methodology and factors considered

- Mapping of mango production areas for suitability of establishing pest free areas
- Factor considered
  - Production and mango varieties
  - Natural barrier
  - Presence of other natural hosts

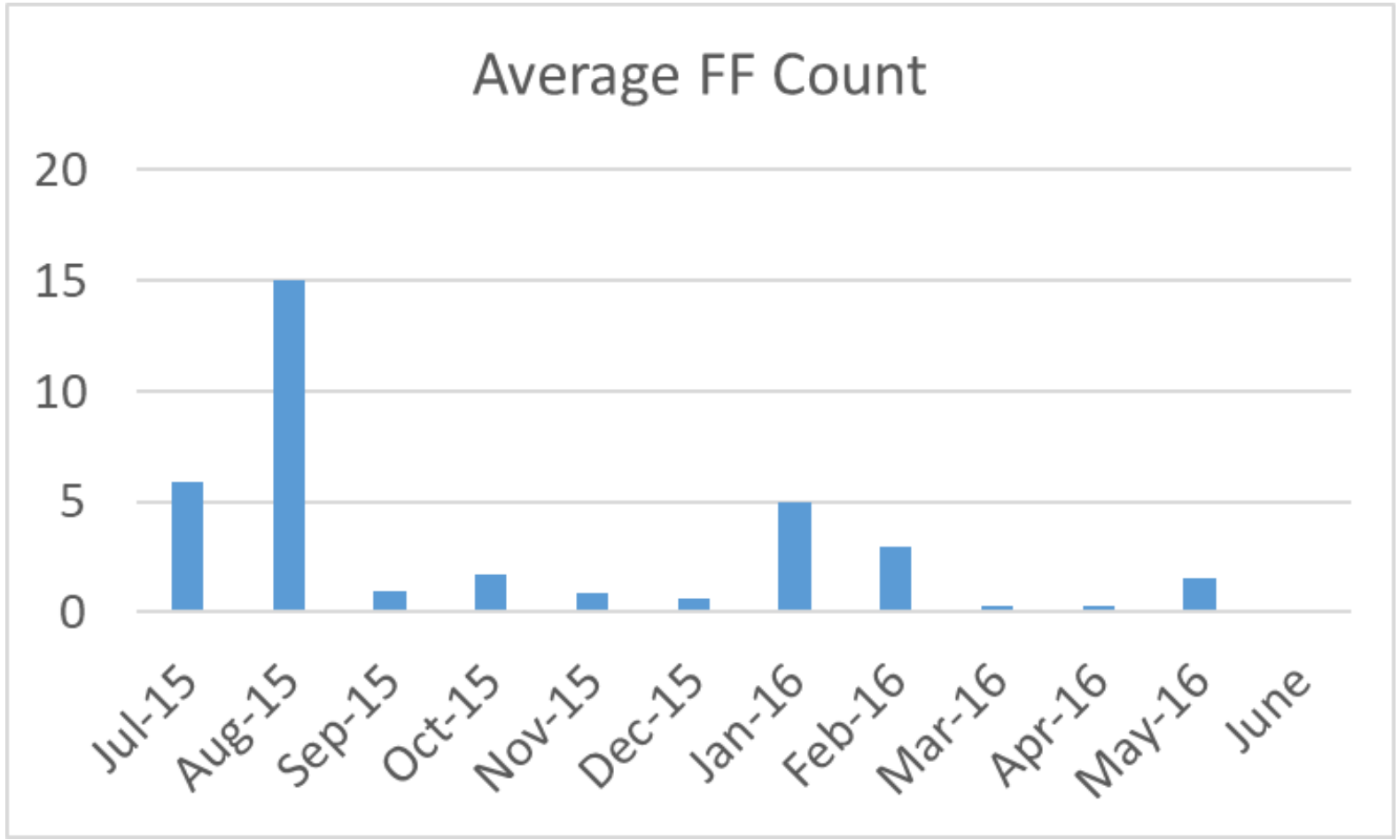
- Established the population of fruitflies in the selected area
- Awareness and mobilization of farmers to support the initiative
- Setting of the traps in the PFA and the buffer zone
- Monitoring and data collection

Case studies of FF-PFA in Kenya



Trend of fruit fly population during mass trapping in Tana River County

Elgeyo Marakwet FF-PFA Site 1



Case study 1: Elgeyo site 1 FTD coefficients

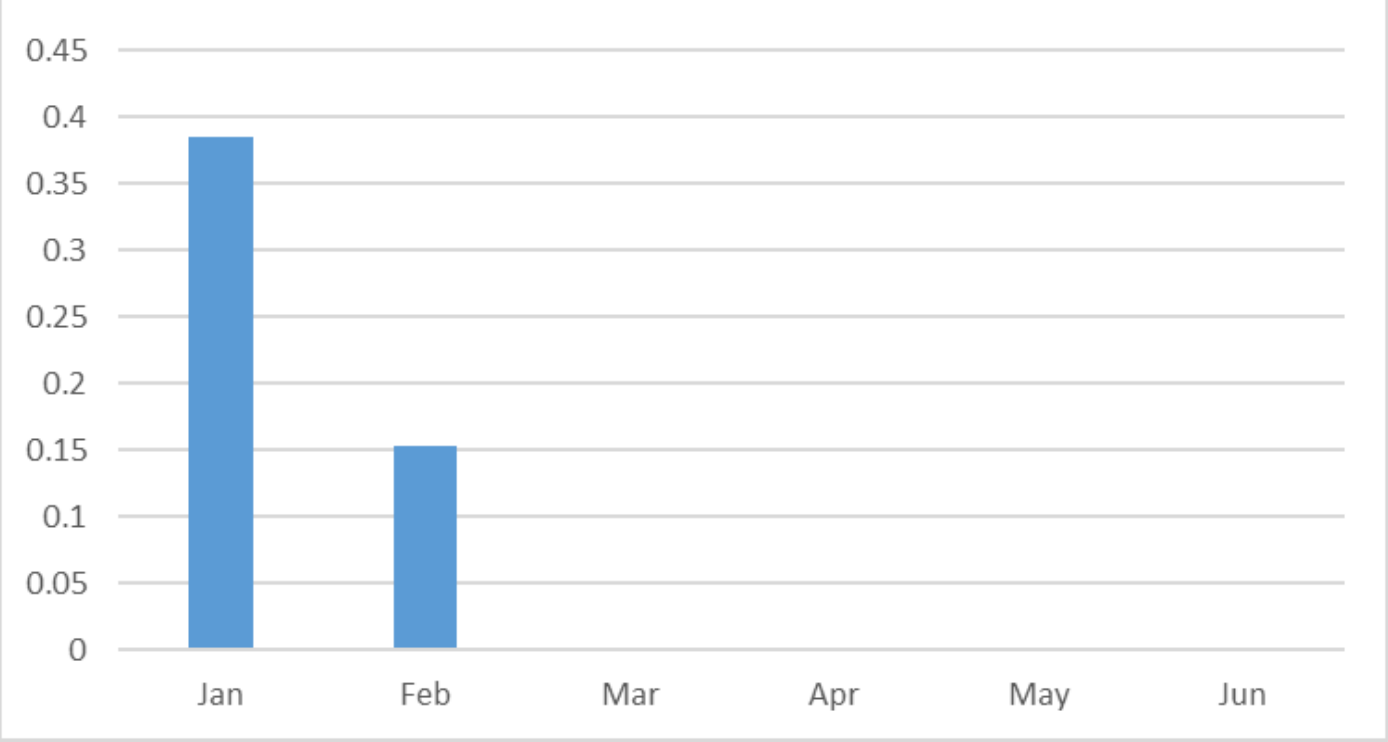
Trap no.	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	March	Apr	May	June
1.	3	7	1	0	0	0	3	3	0	1	2	0
2.	1	4	0	1	0	0	2	1	0	0	1	0
3.	1	3	0	1	0	0	2	3	1	1	2	0
4.	3	7	1	1	0	0	3	3	0	0	1	0
5.	3	4	0	0	0	0	4	3	0	0	2	0
6.	4	9	1	1	0	0	4	4	0	0	3	0
7.	3	7	0	0	0	0	2	2	1	1	2	0
8.	5	10	1	1	1	1	6	2	0	0	2	1
9.	3	12	1	2	0	1	7	3	0	0	2	0
10.	2	13	1	1	0	1	8	3	0	0	2	0
11.	1	4	1	2	0	0	3	3	1	1	3	0
12.	2	4	1	2	0	1	2	2	0	0	3	0
13.	1	6	1	1	0	1	2	3	0	0	2	0
14.	16	20	1	7	1	1	5	3	0	0	2	0
15.	5	19	2	4	11	1	3	3	1	1	1	0
16.	8	35	2	1	1	1	4	3	1	1	1	0
17.	16	21	1	0	1	1	5	3	0	0	2	0
18.	6	9	1	0	1	0	2	3	1	1	3	0
19.	11	45	1	2	1	1	3	4	1	1	1	0
20.	2	4	1	2	0	0	5	3	1	0	1	0
21.	3	13	1	2	1	1	4	5	0	0	1	0
22.	9	31	2	2	1	0	4	5	0	0	0	0
23.	34	40	1	5	1	2	14	2	0	0	1	1
24.	19	40	1	1	2	1	9	3	0	0	0	0
25.	15	32	1	2	1	1	12	2	0	0	1	0
26.	1	32	1	3	2	1	10	4	0	0	1	0
27.	1	7	1	0	2	1	8	2	0	0	1	0
28.	1	9	1	7	0	0	5	3	0	0	1	1
29.	1	6	1	1	0	1	3	4	1	1	2	0
30.	1	5	1	1	0	1	7	2	1	1	1	0
31.	1	8	1	0	0	1	3	3	0	0	1	0

FRUITFLY SPECIES RECOVERED FROM INCUBATED SAMPLES

Bactr*ocera dorsalis, Ceratitis capitata* and *Ceratitis cosysra* emerged from incubated fruits from PFA site

Sample code	Date collected	Collector	Farmer	Identification
SE-150038/015-224	12/10 /2015	H.Heya	Chrsitine Kapter	Bactrocera invadens 9 ♂,7 ♀
SE-150051/015-237	17/11/2015	H.Heya	Kiplagat ,Core area	Bactrocera invadens 9 ♂,7 ♀
SE-150053/015-239	17/11/2015	H.Heya	Kiplagat Homestead	Bactrocera invadens 12 ♂,9 ♀
SE-150054/015-240	17/11/2015	H.Heya	Kiplagat farm B	Ceratitis cosyra 5 ♂ 1 ♀
				Ceratitis capitata 1 ♂
SE-150055/015-241	17/11/2015	H.Heya	Keneth Cheruiyot	Ceratitis cosyra 5 ♂ 6 ♀
SE-150058/015-244	17/11/2015	H.Heya	Kiplagat farm; Core area	Bactrocera invadens 7 ♂,9 ♀
SE-150063/015-249	17/11/2015	H.Heya	Christine Kapter	Bactrocera invadens 5 ♂,4 ♀
E-160226/016/217	25/05/2016	H.Heya	Kiplagat ;Core area	Bactrocera invadens 2 ♂,
				Ceratitis cosyra 4 ♂,1 ♀

Elgeyo Marakwet FF-PFA Site 2



Explanation for varied results

- **Site 1 explanation**: difficulties in maintaining orchard sanitation
- **Site 2 explanation**: spartially separated from other mango ochards & successful orchard sanitation
- Other species of fruitflies other than BI were recovered from fruits incubated from the two sites

Conclusion

- There is great potential in the creation of pest free areas/ places of production if **all the IPM options** are concurrently used for a continuous period of time.
  - Use of pheromone traps
  - Use of food/ protein baits
  - Sanitation
  - Capacity building on establishment of PFA
- Stakeholder have a great role in the establishment of PFA
- The **county government are important in supporting and enforcement creation of PFA**
- **There is need to target all fruitfly species while establishing PFA**
- **Area wide management** critical as pests from surrounding farms can insert pressure on places of production
- Use of biological control for management of the pest

Acknowledge

- RIIP
- KEPHIS
- County government; Makuenu, Tana river, Kilifi, Kwale,
- ICIPE

THANK YOU