Conscent PE mating disruption system is an effective alternative of Methyl bromide to control stored product moths, *Plodia interpunctella, Ephestia Kuehniella, Ephestia cautella* and *Ephestia elutella.*

HASSAN, M. N., and Al-Zaidi, S.

Russell IPM Ltd,

Deeside, Flintshire, CH5 2LA, UK

INTRODUCTION

- The Pyralid Moths, *Plodia interpunctella, Ephestia cautella, Ephestia kuehniella, Ephestia elutella* are most wide spread key pests of stored products.

- The larvae of these moths feed on stored nuts, dried fruits, cereals, legumes and causing substantial economical loss due to infestation.

- Current control methods mostly rely on application of insecticides. Recently these pyralid moths have acquired reduced susceptibility to conventional insecticides.



- *(Z,E)*-9,12-tetradecadien-1-ol acetate has been identified as component of female *Plodia interpunctella* pheromone blend (Brady *et al.,* 1917, Kuwahara, *et al.,* 1971).

- Although most of the insect's pheromone is species specific, *(Z,E)*-9,12-tetradecadien-1-ol also is a component of several Pyralidae moths, *Ephestia cautella, Ephestia elutella*, and *Ephestia kuehniella* (Phelan 1992).

- Mating disruption of stored grain moths have been shown great potentials. In early 1975, Sower et al., showed using *(Z,E)*-9,12-tetradecadien-1-ol acetate 90-95% mating of *P. interpunctella* could be reduced in low population densities.

- As methyl bromide has to be phased out worldwide by 2015 and restrictions on application insecticide due to human health concern an alternative bio-rational pest management system is being urgently sought.

- One possible solution is the use of pheromone mediated mating disruption that could be an effective, safe, sustainable, control measure.

- Mating disruption (MD) trials on stored moths have been conducted at smaller scale. Ryne et al. (2001) showed different dosages and blends of pheromone components to disrupt mating of *P. interpunctella* at different population densities.

- Ryne et al., in 2006, conducted MD trial on *E. cautella* by using dispensers emitting Z9,E12-14:OAc and concluded, a significant number of trap catches decrease in pheromone traps during mating disruption trial.

- Again, Ryne et al., 2007 evaluated effect of mating disruption dispenser to suppress mating of *E. kuehniella* and *P. interpunctella* in indoor facilities and found that populations of two important pests on stored products, can be reduced using high doses of Z9,E12-14:OAc in large indoor facilities.

- In present study large scale mating disruption trials have been conducted in the UK breakfast cereal manufacturing factories using high doses (100 mg / dispenser) of Z9,E12-14:OAc.

- In experimental site before mating disruption trial food moths, *P. interpunctella, E. cautella, E. kuehniella, E. elutella* were control by sole application of conventional fumigation systems.

- The objective of the study was to check whether mating disruption system Conscent PE could deliver a significant control.

Materials and Methods

- Location: Breakfast cereal manufacturing Facility, North Wales, United Kingdom.

- The studies were conducted nine indoor stored product facilities as Tank Floor, Packing Hall, Country Store, Fruit Tunnel, Warehouse, Mechanical Stores, Mechanical Workshop, 4th Process, Process.

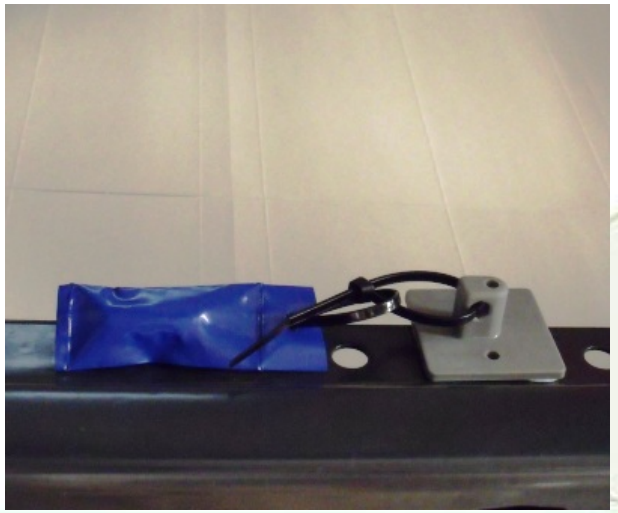
- Total area of Experiment was 55000 square feet. Conscent PE mating disruption dispensers were placed 3 meter above from the floor in every 10 meters interval.

- The Mating Disruption dispensers were solid dispenser, 100 mg of Z-9, E-12-Tetradecadien-1-yl acetate was dispensed in cellulose acetate dispenser covered with high density plastic.

Conscent PE
mating disruption dispenser.

Plodia / Ephestia prebaited pheromone trap.

- The mating disruption dispenser Conscent PE is specifically oriented for use in enclosed spaces leading to the increase concentration of the pheromone in the air.
- The pheromone traps were place in every 15 meters 2 meters above the floor level.
- Monitoring trap: 1 mg of Z-9, E-12-Tetradecadien-1-yl acetate was released from polymer matrix and used in sticky diamond trap.



Pheromone trap catches in use in Mating disruption trial sites

- **Longevity** of Conscent PE mating disruption dispenser is 90 days. Therefore dispenser has been changed every 3 months.

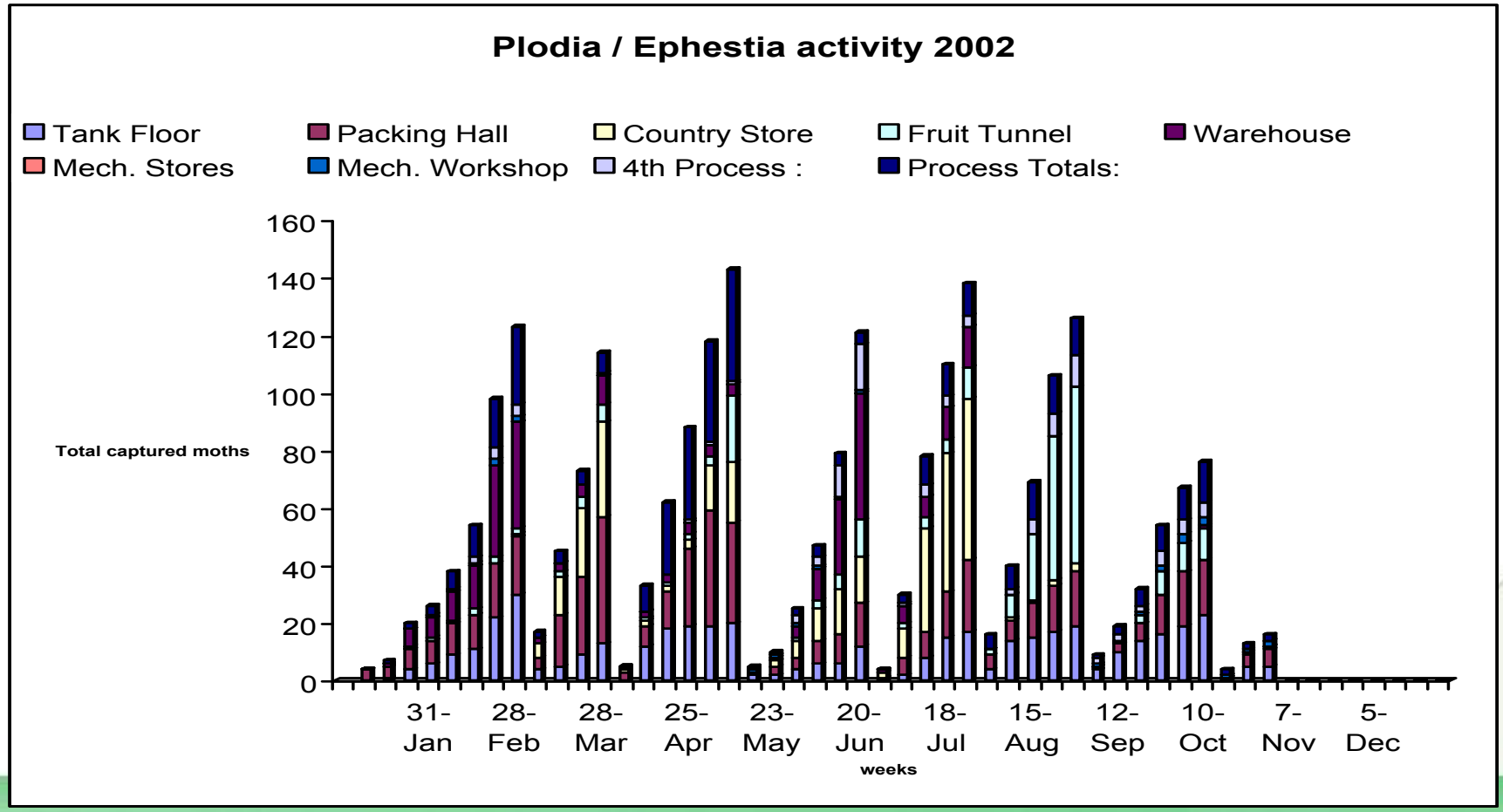
- **Data collection:** Trap catches data have been collected once in a week. The pheromone trap was replaced once it is full.

- **Application time:** Consent PE dispenser has been place beginning of the year 3rd of January and continued all round the year.

- **Conscent PE** mating disruption system was designed to be applied around the year and as apart of an Integrated Pest Management (IPM) programme.

Mating disruption trial, 2002

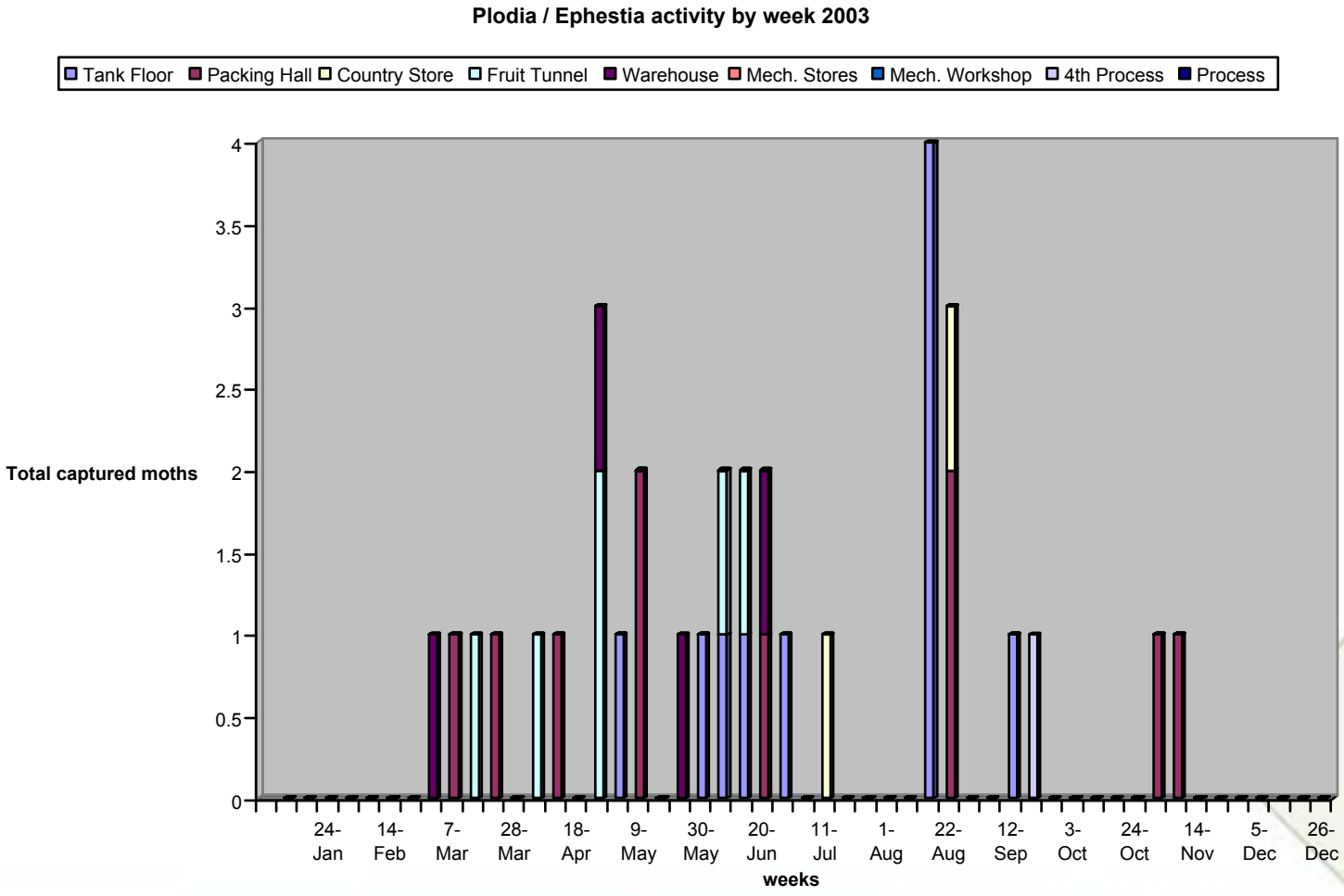
- Initial population was high. The maximum 150 moths / week were captured in pheromone traps and end of the year population dropped and
- The lowest population was recorded on 1st week on December after one year Mating disruption trial.



Mating disruption trial, 2003

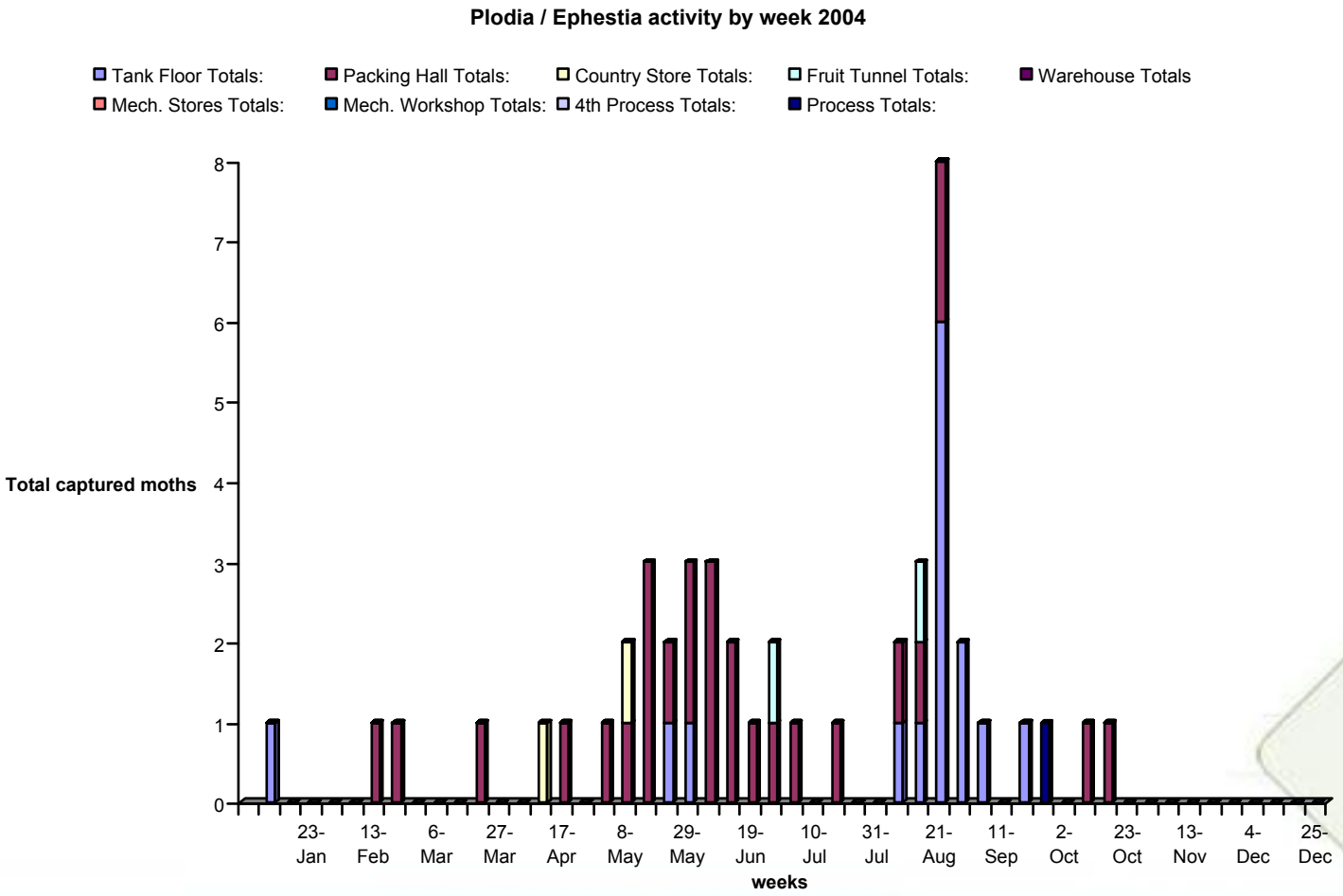
- Plodia / Ephestia moth captured in pheromone trap reduced significantly. The highest trap catch was 4-5 moths / week.

- Beginning and end of the year population kept 0-1 in the pheromone trap.



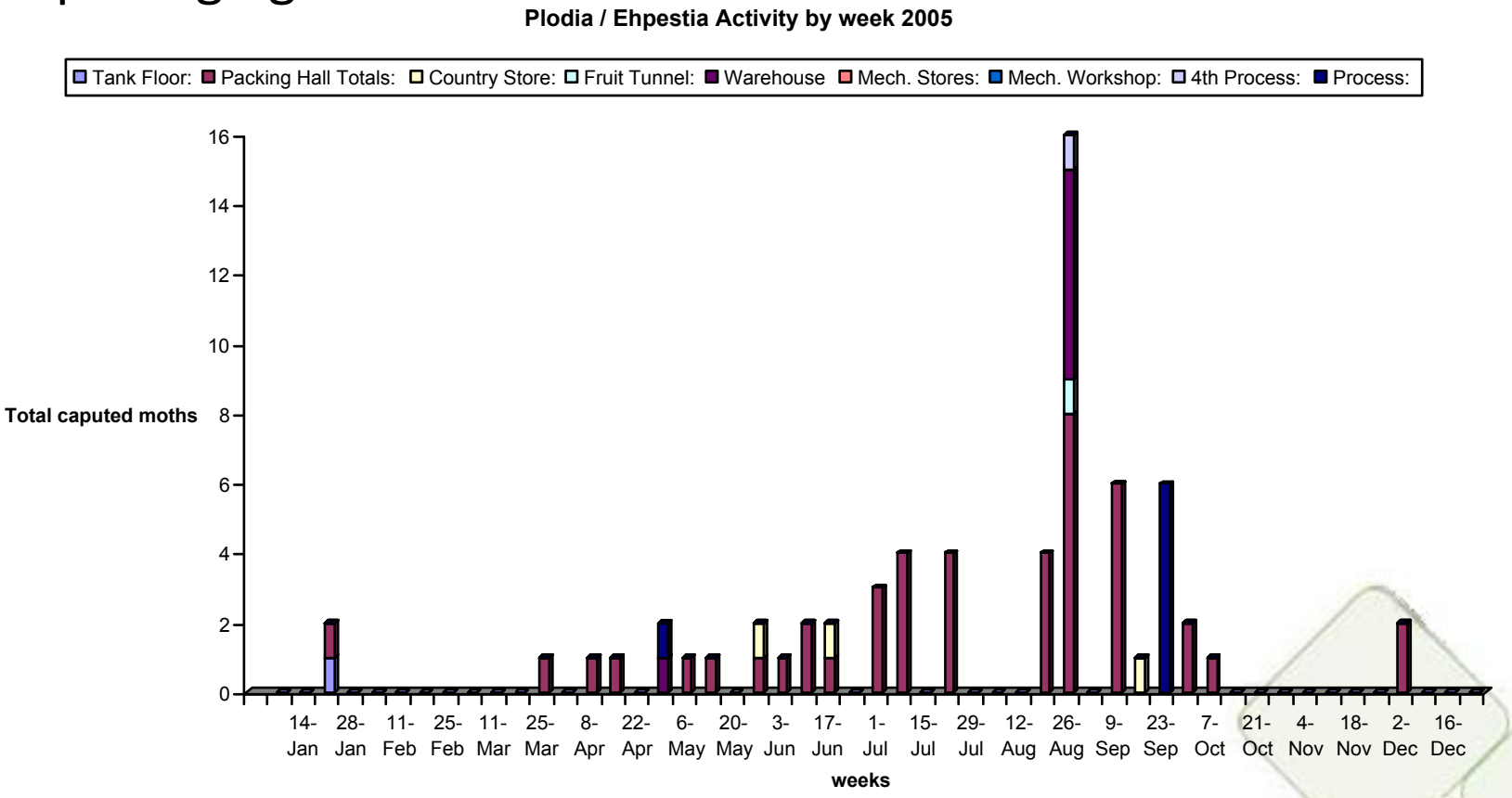
Mating disruption trial, 2004

- In 2004 moth capture rate was low. Total number of captured moth was significantly lower than initial population of 2002.
- Maximum trap catches were shown as 8 moths / week in the month of August. Low level on infestation was recorded.



Mating disruption trial, 2005

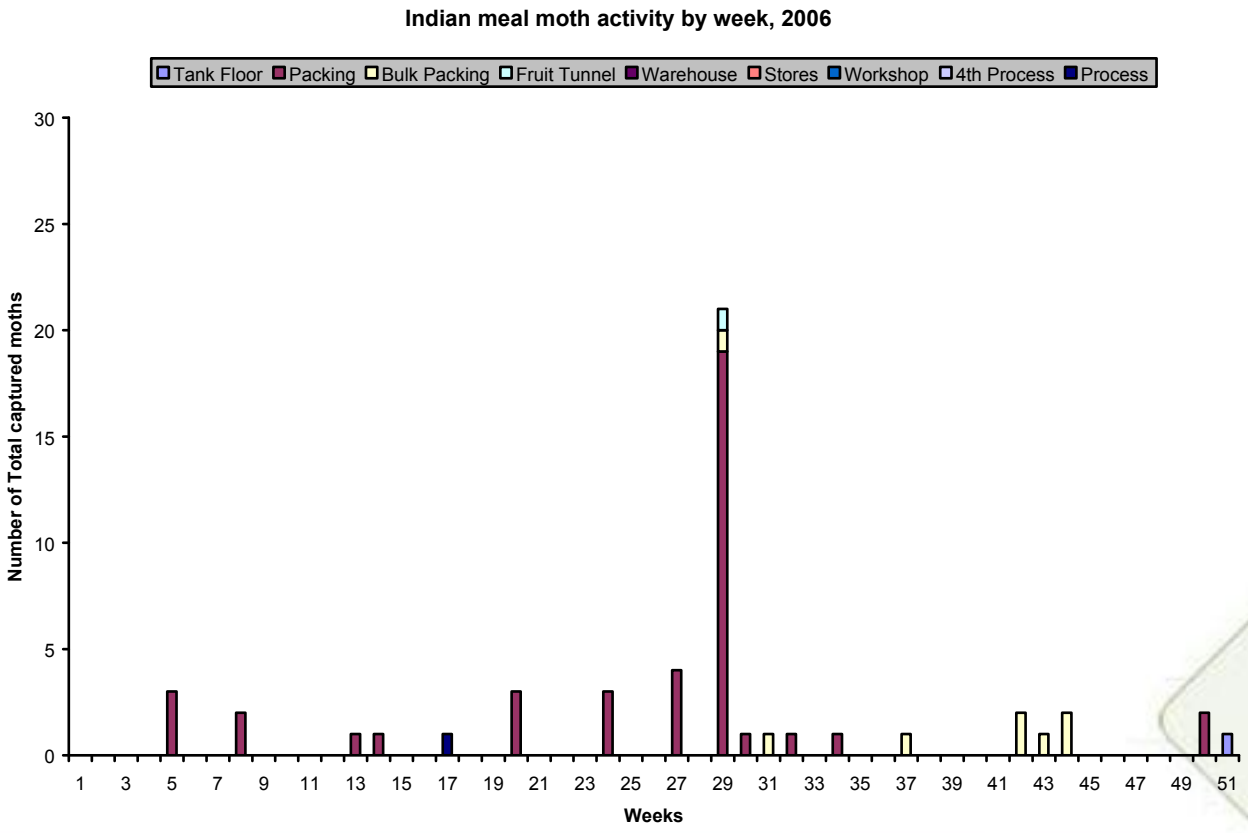
- In 2005 total trap catch followed similar trend apart from a slight increase of trap catches of 16 / week was found on end of August.
- Though out the year maximum number of insect captured in the packaging hall.



Mating disruption trial, 2006

- In 2006 again number of total moths captured in trapping areas were low. Total trap catch though our the year was less then five apart from population increase in end of August as 2005.

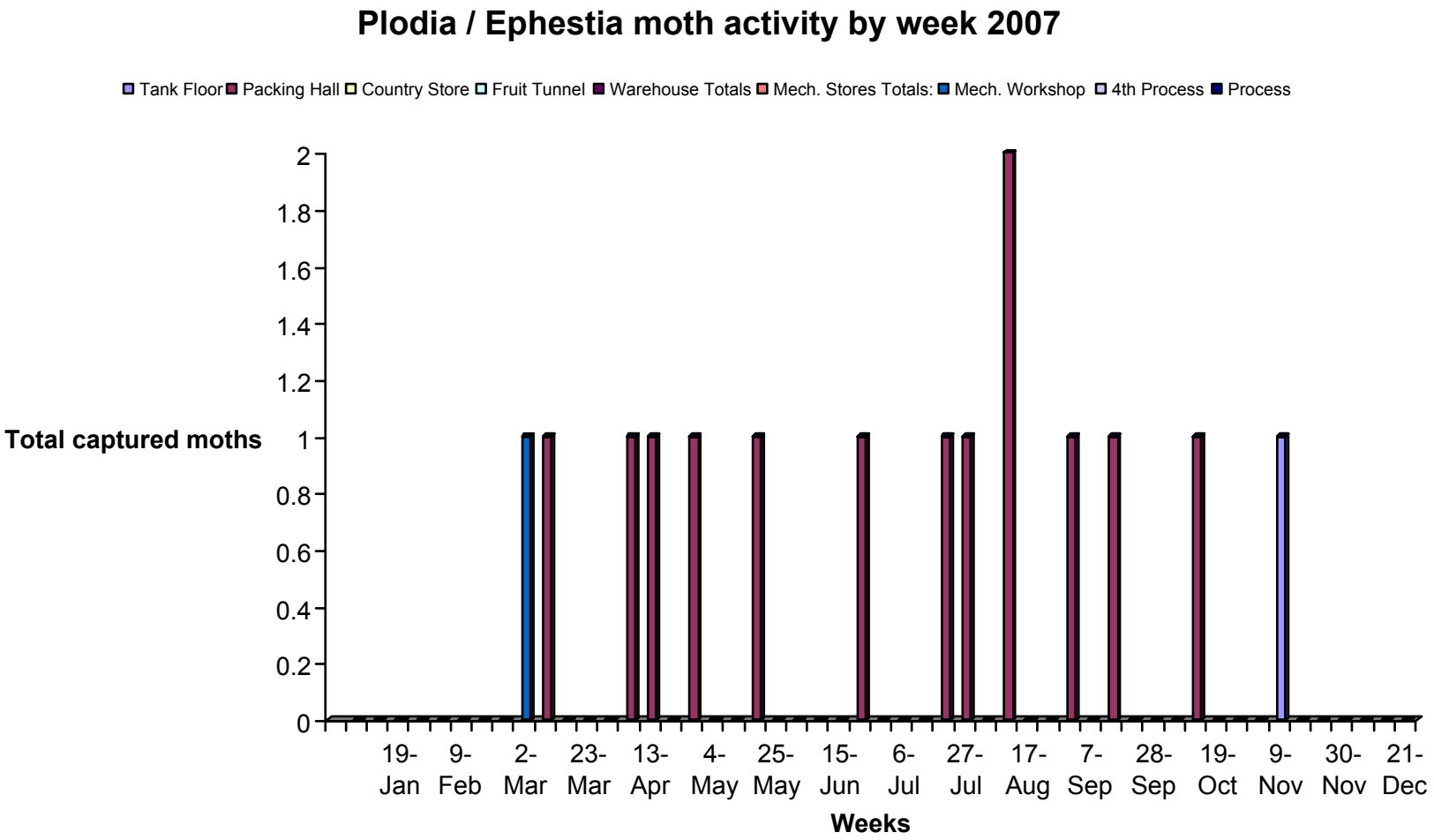
- However the rise was insignificant in compare to the initial populations.



Mating disruption trial, 2007

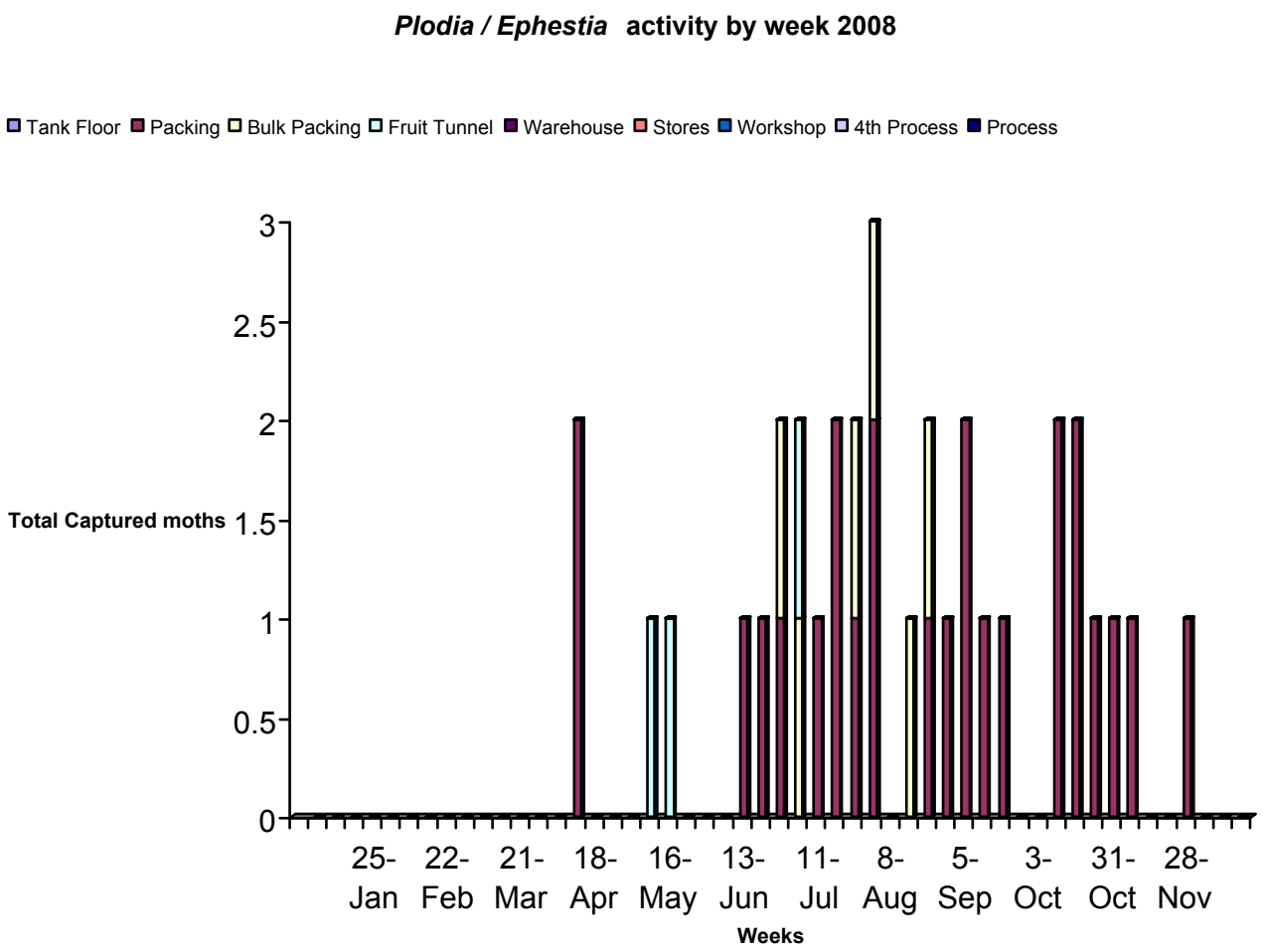
•In 2007 trap catches were reduced substantially. Total number of trap catches of 9 facilities were very low and never exceed more the 2 moths / week.

• All along the year consistently moth population was low due to the continuous application of Mating disruptions as 2005.



Mating disruption trial, 2008

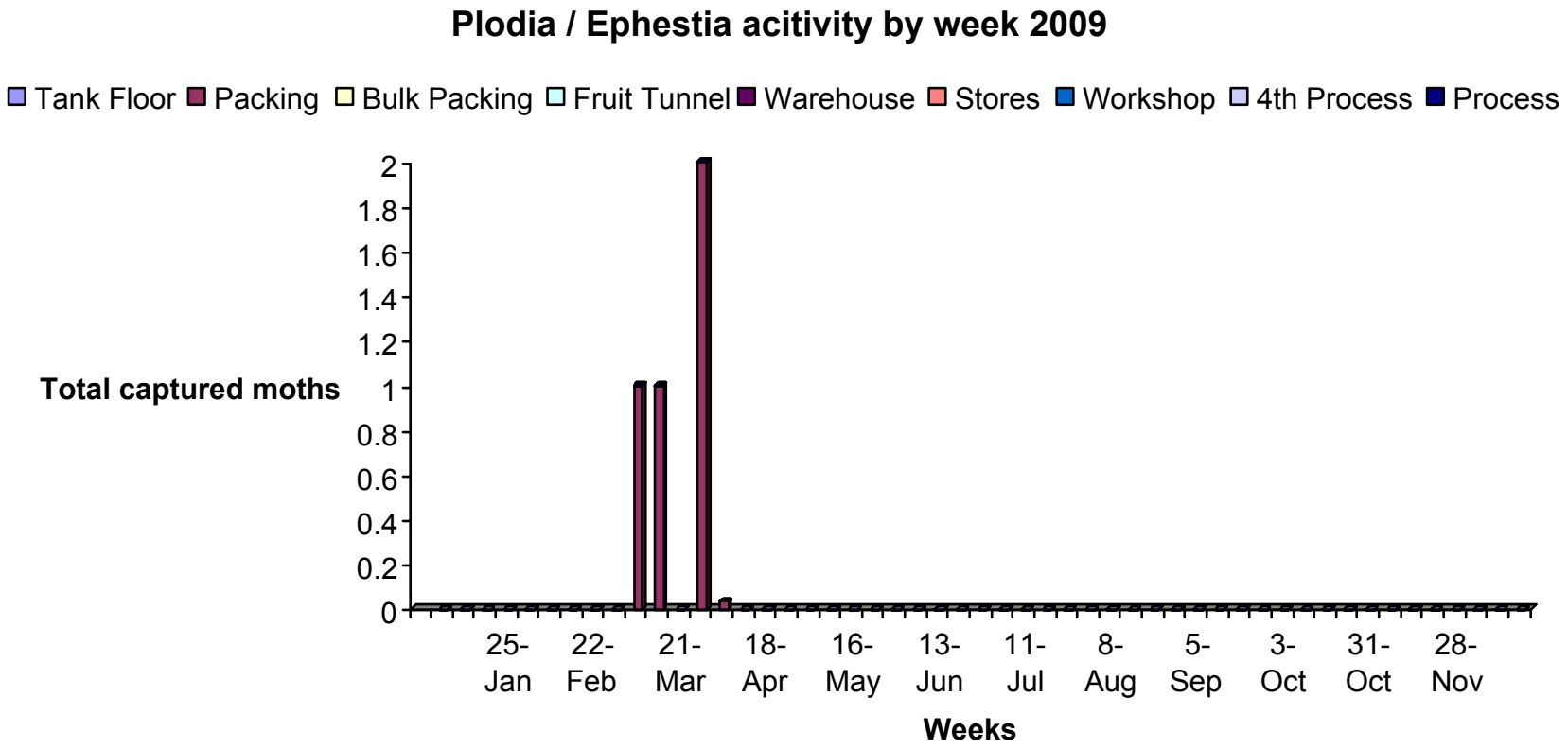
- In 2008 similar lower level of Plodia / Ephestia moths was recorded. Through out the whole year moth population never exceed 3 moths / week.
- Infestation was significantly lower and provide good control.



Mating disruption trial, 2009

- Finally in 2009 pheromone traps were failed to capture Podia / Ephestia moths apart from 1-2 moths / week in end of March and beginning of April.

- Mating disruption system provide a significantly disrupt the mating Therefore moth population reduced significantly.



Conclusion

- Conscent PE reduced the stored moth population significantly.
- *Plodia interpunctella* and *Ephestia* species were controlled solely by mating disruption.
- Customer complain was reduce abundantly and to date become nil.
- Cereal manufacturer are now able to control Plodia Ephestia on their premises without application of chemical insecticide.
- Since, 2002 cereal manufacturer never stopped the production for chemical Fumigation.
- Further studies are going to be continued in the same premises in UK and other 3 sites in Greece, Italy and Czech Republic for more precise results.

Thanks for your attention.