EMPTY PESTICIDES CONTAINER MANAGEMENT

PILOT PROJECT

CropLife MAURITIUS

Co-funded by UNDP/GEF
Small Grant Programme & Crop Life International

Ministry of Social Security, National Solidarity, and Environment and Sustainable Development
(Environment and Sustainable Development Division)

gef

SGP The GEF Small Grants Programme

UNDP

CropLife INTERNATIONAL

TABLE OF CONTENTS

EXECUTIVE SUMMARY

A pilot project to study the feasibility of a national empty pesticide container management programme was initiated by CropLife (Mauritius), as part of its product stewardship framework.

A pre-project survey indicated that since there was no specific facility for the disposal of hazardous wastes on the island, the farming community had developed disposal practices which were not in line with the provisions of the Environment Protection Act and global goals to save the planet.

In order to have a good understanding of all the implications involved in the setting up of a collection and safe disposal programme at national level, it was decided to carry out a study on a representative sample of the different farming groups and in various parts of the island.

Four farming regions were selected with different cropping, ownership and management systems. A project plan was prepared and adequate funds were sought. A fulltime team of field staff was hired and progress reports were regularly relayed to a Project Monitoring Committee. Suitable advice and corrective measures were provided to the project leader as and when necessary.

The project lasted 30 months and the findings indicated that the project can be expanded in phases to finally be implemented over the whole island. Recommendations, based on lessons learnt during the pilot project, are provided for a successful approach.

1.0 INTRODUCTION

CropLife International is a global network representing the plant science industry. Stewardship is a life cycle approach to product management. It is the responsible and ethical way to manage crop protection products from their discovery and development, to their use and the final disposal of any waste and shown in Figure 1. The overall aim of the stewardship approach is to maximize the benefits, and minimize any risks, from using crop protection products.

Figure 1. – Product life cycle

The global network extends over six large regions, namely: North America, South America, Europe, Africa / Middle East, Asia and Japan.

CropLife Africa Middle East consists of three hubs: (1) North Africa and Middle East, (2) Western and Central Africa and (3) Eastern and Southern Africa.

CropLife (Mauritius) is the local association of companies dealing in crop protection products and is registered with the Registrar of Associations. CropLife (Mauritius) is a member of the Eastern and Southern Africa Hub.

Since the 1992 Earth Summit in Rio de Janeiro, public and private cooperation and multi stakeholders' partnerships have evolved to include major groups in search of a common goal: Sustainable Agriculture. CropLife as a key stakeholder, has much to offer to facilitate technology transfer and capacity building, especially to small growers who play a critical role in ensuring food security.

CropLife (Mauritius) in its endeavor to provide solutions to increase agricultural production, whilst mitigating damage to the eco-system and the depletion of natural resources for future generations, carried out a survey in 2011, on the disposal practices of empty pesticide containers on the island of Mauritius. The findings were alarming and CropLife (Mauritius) decided to set-up a programme for the collection and safe disposal of these containers.

The project write-up was submitted to CropLife Africa / Middle East and to UNDP GEF Small Grant Program for funding assistance. Both organizations agreed to support the project financially. The

Empty Pesticide Container Management Program, in the form of a pilot project was launched in February 2015.

2.0 UNDP GEF – SGP

Established in 1992, the year of the Rio Earth Summit, the GEF Small Grants Program embodied the very essence of sustainable development by "thinking globally and acting locally". By providing financial and technical support to projects that conserve and restore the environment while enhancing people's well-being and livelihoods, SGP demonstrates that community actions can maintain the fine balance between human needs and environmental imperatives.

The project submitted by CropLife (Mauritius) was approved on the primary focal area of "Chemicals (POPS) and as a secondary focal area "International Waters". The project category was "Capacity development".

3.0 RATIONALE OF IMPLEMENTING A CONTAINER MANAGEMENT PROJECT IN MAURITIUS

Following a survey conducted in 2011 by CropLife (Mauritius), to assess the situation regarding the disposal of empty pesticide containers in Mauritius, it was found that most farmers discarded their empty containers by (i) dumping them on field borders, (ii) burning them with crop refuse or (iii) by burying them in their fields as shown in plates 1 and 2. It was estimated that the annual volume of plastic pesticide containers generated by farmers nation-wise amounted to 37,600 kg.

Plates 1 and 2. – Two non-environment friendly practices of farmers for container management

A previous attempt to pesticide container management was initiated by “Association Professionelle des Producteurs / Exportateurs de Produits Horticoles de Maurice” (APEXHOM) in 2007. A dozen collecting cages were placed at various locations including Farmers Service Centers. The project was unfortunately abandoned after one year. The lessons learnt from the failure of that project were:

- There were not enough awareness and training done.
- The cages were too small.
- Cages served as garbage bins.
- The recycler was not equipped to process HDPE containers.
- Most of the containers collected were not triple-rinsed and were not accepted by the recycler.

The project conceived by CropLife (Mauritius) in 2014 took into consideration all these causes of failure.

4.0 THE EMPTY PESTICIDE CONTAINER MANAGEMENT PILOT PROJECT

The pilot project initiated by CropLife (Mauritius) was designed so as to study all the different aspects of training and inducing farmers in cleaning their empty pesticide containers after use and to dispose of them in a safe and responsible manner.

Four farming areas were selected, each having a different profile, as indicated in figure 2 below.

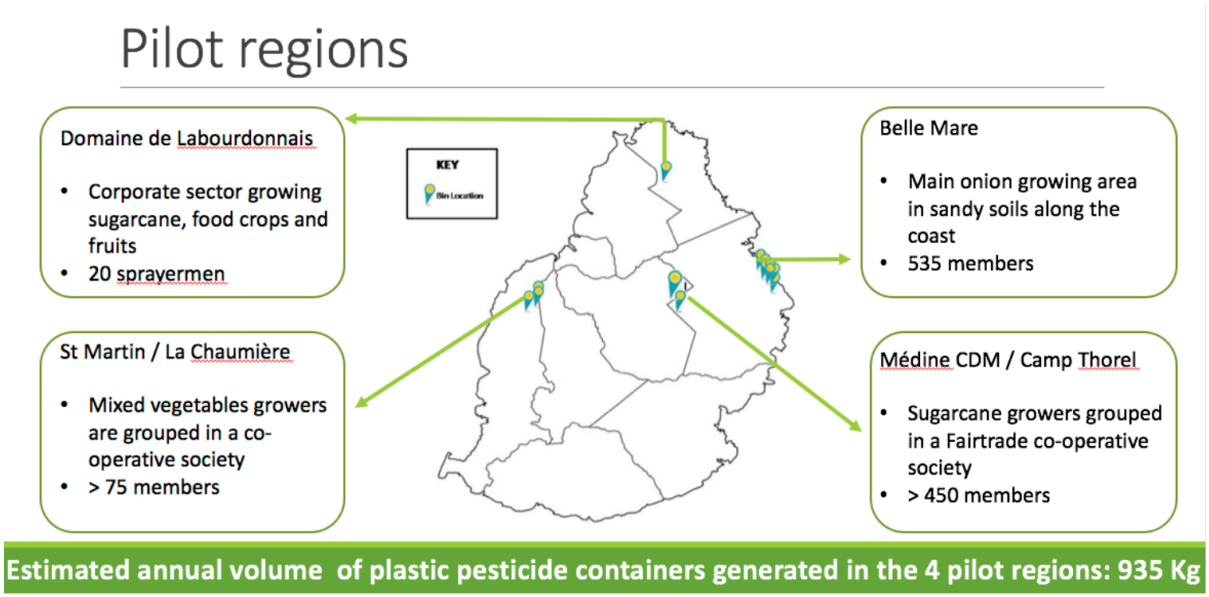


Figure 2. – Map of Mauritius showing pilot project regions

1. **Domaine de Labourdonnais** – a corporate organization growing sugarcane, fruit trees and some foodcrops in a dry region, situated in the north of the island.
2. **Belle Mare Water Users Co-operative Society** - a co-operative society with 535 members, growing mainly onions on a belt of sandy soil, along the east coast of the island, with irrigation facilities. The area under cultivation was divided into 7 sub-regions, namely: Ajanta, Ambre, Badamier, Cemetery, Four à Chaux, Palmar and Flacq, for better monitoring.
3. **St Martin Agricultural Marketing Cooperative Society** – a co-operative grouping 75 farmers growing mixed vegetables and fine herbs all year round, in the dry western part of the island.
4. **Medine Camp de Masque Credit Cooperative Society (C.C.S.)** – a Fair-trade certified co-operative grouping 450 small to medium sugarcane farmers in the east of the island.

It has been estimated that the annual volume of plastic pesticide containers generated in the four pilot regions amounts to 935 kg.

The project consisted mainly of the following activities: -

1. Creating awareness among the farmers and in the community around the farming areas, on the importance of safe use of pesticides and safe disposal of empty pesticides containers, in order to minimize risks for people, animals and the environment.
2. Training farmers on the triple-rinsing techniques of empty pesticide containers.
3. Design, construction of suitable cages for the collection of empty containers.
4. Finding the best locations for positioning the collecting cages.
5. Identifying a suitable recycler.
6. Organizing the logistics for the verification of triple-rinsed containers and their transport to the recycler's premises.
7. Monitoring field reports and making adjustments for the good running of the project.

An initial number of 1,000 farmers was targeted. They were all grouped in cooperative societies and were representative of the different types of farming in Mauritius, irrespective of age, sex, religion, educational level, acreage grown, experience and crops cultivated.

A memorandum of understanding (M.O.U.) was signed between CropLife (Mauritius) and the President or Manager of each of the four pilot sites in order to obtain their respective commitment to the project.

Another M.O.U. was signed between CropLife (Mauritius) and Surfrider Ltd, the recycling company, based in Cottage, Mapou.

4.1 AWARENESS CAMPAIGN

The awareness campaign consisted in group meetings in the Society's meeting halls, as well as in Village Halls. A total of 15 group awareness meetings were run in the four pilot regions and a total of 450 people attended them. During each of these meetings there was a demonstration of triple-rinsing.

One of the unexpected outcome of these awareness meetings, was that several neighboring non-targeted organizations showed great interest in the project. They were: Alteo Ltd., Omnicane Ltd., Compagnie Sucrière de St Antoine and Constance La Gaieté Co. Ltd. from the sugar sector and Constance Belle Mare Plage, Beachcomber Ltd., Top Turf and AGREX Ltd., from the hospitality sector.

Some of them asked for training on triple-rinsing, which was done. A few of them implemented the project scheme voluntarily in parallel.

4.1.2 OTHER AWARENESS INITIATIVES

- The Container management team had a stand at:
    - World Environment Day fair, at the Gymkhana grounds in Vacoas.
    - Small Farmers Welfare Fund exhibition.
    - The Farmers days organized by Roger Fayd'herbe & Co Ltd.
- 150 posters and 3,500 flyers on triple-rinsing and safe disposal were printed and distributed. The poster was placed at all Farmers Service Centers and Extension Service offices; and also at all pesticides dealers' shops in the 4 pilot regions. The flyers were mostly distributed during group awareness meetings.
- Boards showing the triple-rinsing steps and disposal into the collecting cages were printed and fixed on the side of all the cages.
- A radio programme, in the local creole language on the pilot project was prepared with the help of the Food and Agricultural Research and Extension Institute (FAREI) and broadcasted during a whole week, in the morning farmers program.
- A Facebook page was created to maintain awareness on the pilot project by sharing news on progress made.

4.2 TRAINING ON TRIPLE-RINSING

Triple-rinsing of empty pesticide containers is a proven method of rinsing which removes 99.99 % of pesticide residues from the containers promoted by CropLife worldwide.

A training plan was established to ensure training on the triple-rinsing technique throughout the project duration. It implied a series of both group and one-to-one training sessions. Training was performed indoors for groups and in Farmers fields for individuals.

Farmers were taught:

- When and how to triple-rinse the pesticide container.
- Where to dispose of the washing water.
- What to do with the clean container.

900 Farmers from the 4 pilot regions were trained during 30 group sessions. There were 30 group training sessions and a total of 1,192 individual visits to farmers in their fields. Figure 3 shows the poster produced for sensitizing farmers and create awareness for triple rinsing while plates 3 and 4 shows the change in colour of the rinsate from the first to the third rinsing.

Figure 3. – Poster sample on triple rinsing technique

A video from CropLife International, showing the whole process of triple-rinsing, originally in English, was dubbed in creole language to facilitate understanding and was projected at all group meetings.

Plates 3 and 4. – Training on triple rinsing technique at Alteo Limited (Left hand side: first rinse; right hand side: last rinse)

4.3 COLLECTION AND DISPOSAL

Once the design and dimensions of collection cages were approved by the Project Monitoring Committee, two types of materials were used for their construction: (1) galvanized metal frames and wire-mesh, (2) recycled plastic material and wire-mesh (Plate 5).

Plate 5. – Photograph of cages used during pilot project

Their respective dimensions were:

- Metal Cage – 1500 mm long x 1000 mm wide x 1800 mm high.
- Recycled cage – 1600 mm long x 1600 mm wide x 1500 mm high.

The idea behind was to check their respective weather resistance, among other things.

Each cage was equipped with a small opening on one side, with a flap, to take in the containers and a larger one in front, with a door under lock, to facilitate removal.

The cages were placed at strategic locations, after consultation with the farmers and after clearance from the officer of the Ministry of Environment, Sustainable Development & Disaster and Beach Management.

A total of 14 collecting cages were placed in the four pilot regions and they were all identifiable by the colorful triple-rinsing board fixed on them. The soil beneath the cages was covered by plastic sheets to contain possible leakages from the odd non-triple-rinsed containers. The four legs of the cages were fixed in concrete blocks in order to ensure stability and to avoid any risk of theft. Table 1 below shows the distribution of the 14 cages over the four pilot regions.

Table 1. – Number of cages placed per pilot regions

Pilot regions	No. of cages placed
Domaine de Labourdonnais	1
St. Martin	2
La Chaumiere	1
Belle Mare	7
Médine Camp de Masque	2
Camp Thorel	1
TOTAL	**14**

The cages were inspected regularly. The containers deposited were checked for residues at monthly intervals and recorded. The recycler was informed whenever it became necessary to collect and transport to the recycling plant.

5. PROJECT MANAGEMENT

The project Monitoring Committee (PMC), chaired by the President of CropLife (Mauritius) comprised the Vice-President of CropLife (Mauritius), the Project Team Leader and a Project Consultant, appointed by CropLife (Mauritius). This committee met every fortnight during the first 12 months and every week thereafter. The project leader submitted a field report prior to each meeting highlighting progress made and problems encountered. Timely decisions were taken with appropriate support to field staff and corrective measures when necessary.

The difficulties encountered in trying to meet all the farmers in the four pilot regions lead the PMC to request the team leader to downsize the original target of 1,000 farmers to a more manageable number. It was then decided to focus on a reduced number of farmers around the collecting cages, more precisely those who had a positive attitude towards the project. These farmers were designated as CORE FARMERS. A total of 300 farmers were listed as Core Farmers.

Furthermore, nine PROJECT SUPPORT FARMER (PSF) were appointed from among the Core Farmers, on the basis that they were identified as being group leaders, their fields were close to the collecting cages and they were willing to provide their support to the project. These PSFs were visited regularly by the project field staff to support them in their actions towards the Core Farmers around their cage location. Their duties were to:

1. Assist the project team.
2. Supervise one collecting cage and the farmers around.

3. Encourage neighboring farmers to triple-rinse their pesticide containers.
4. Convince them to use the collecting cage to dispose of their empty containers.

The Core farmers were given a GREEN CAP and the PSF Farmers had an ORANGE CAP for identification purposes.

Members of the PMC had meetings at each pilot site with the PSFs, in the presence of the President or Secretary of the Cooperative Societies to discuss about some issues that were slowing down the process of adoption.

At Domaine de Labourdonnais, the corporate farm, three supervisors in charge of spray operators were designated as PSFs.

On several occasions, the PMC chair called for assistance from FAREI, from the Mauritius Cane Industry Authority (MCIA) and from District Councils with very positive response from all quarters.

In September 2016, a remarkable diminution of empty containers was observed. A meeting of all PSFs was convened at FAREI office in St Pierre, in the presence of the UNDP GEF SGP representative and officers of FAREI to investigate the reason. The representatives of two cooperatives expressed the need for some incentives in order to carry on with the project.

At the following PMC meeting it was decided to introduce a REWARD SCHEME to gratify the best PSF and the best complying farmer to motivate them. An agricultural sprayer was chosen as star prize. Collecting woven bags, printed with sponsors logos and a Farmer identification number were ordered and distributed to all Core Farmers in the four pilot regions.

The project team monitored the cages monthly. The bags were emptied and triple-rinsed containers were separated and counted. The following records were raised:

- Number and weight of triple rinsed containers / per farmer
- Number and weight of non-triple rinsed containers / per farmer
- Percentage of triple rinsed containers /per farmer

A notice board was also placed at cooperative societies to enable farmers to keep track of their monthly progress.

Monthly results were compiled so as to determine the farmer who had recorded the highest percentage of triple rinsed containers. The first prize would be a 16 L sprayer whilst the second and third prizes would be 1 x 50 kg of compost bag and 1 x 25 kg of compost bag respectively.

The graph below shows progress made during the pilot project with regards to triple rinsing of empty pesticides containers in the different regions

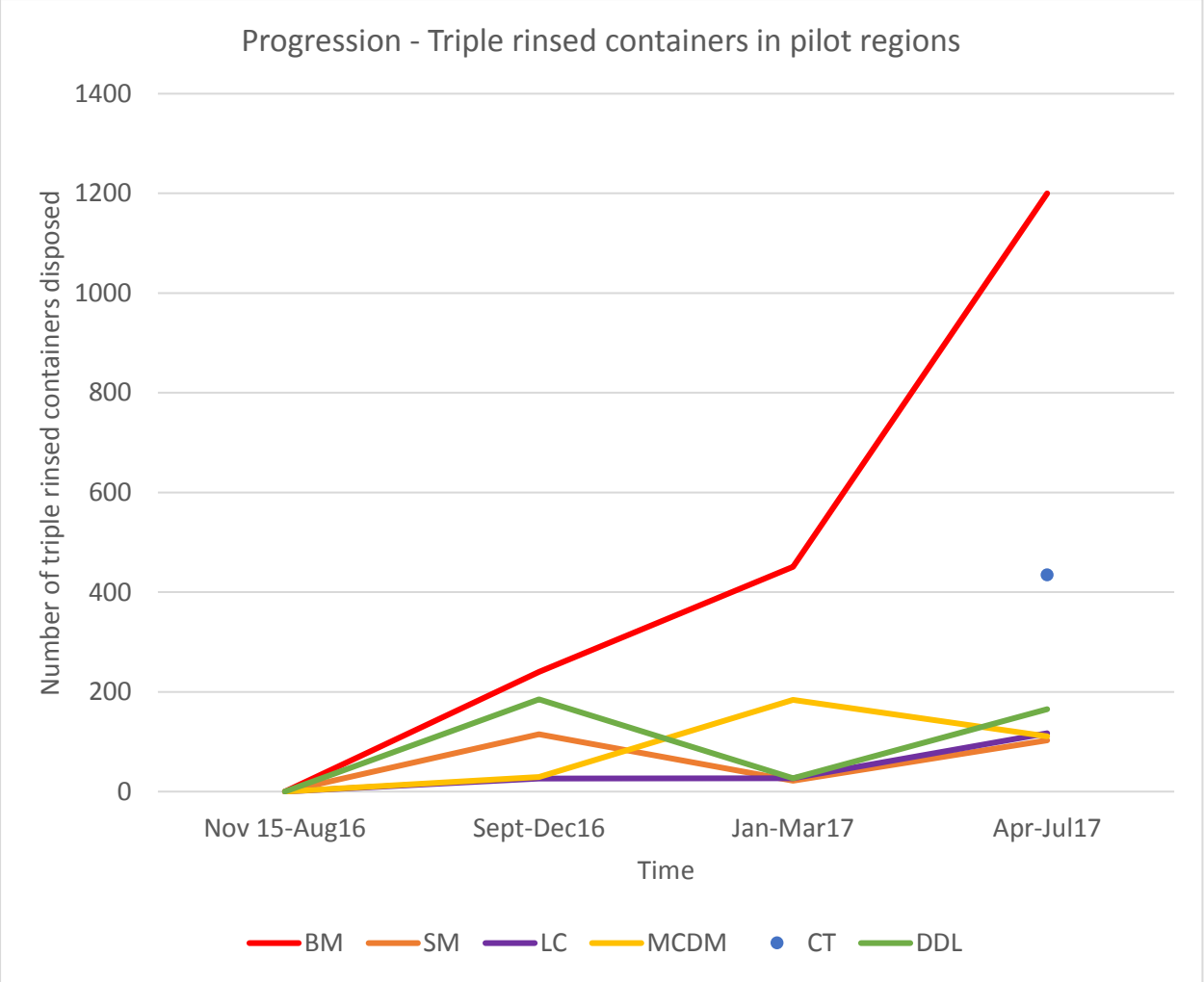


Figure 3. – Evolution of number of triple rinsed containers at the different collection sites

For the period Nov 2015-Aug 2016, the number of triple rinsed containers was negligible for most pilot regions. Following intensive training in the pilot regions, the number of triple rinsed containers started to increase as from September 2016 as shown in Figure 3.
Among the pilot regions, Belle Mare had the largest number of triple rinsed containers generated since beginning of the project.

From Table 2, it can be observed that a total number of 6,892 units (467 Kg) were disposed in the pilot regions making a percentage of 75.6% of triple rinsed containers.

In May 2017, the PMC decided to carry out a survey in the four pilot regions, to verify the findings of the project field staff. A different team made up of the sales staff of CropLife member companies was used for that survey.

Table 2. – Summary of waste collected at the different sites

	Total no. of containers generated. (Weight kg)		Total weight of containers generated (prior to Sept. 2016)	Total weight of containers generated (after Sept. 2016)	% of Triple rinsed containers
Belle Mare	3,693	(192.3)	82.0	110.4	77.4
St Martin	865	(39.34)	23.1	16.2	66.2
La Chaumière	256	(10.1)	0	10.1	66.4
Médine Camp de Masque	1,031	(63.6)	15.0	48.6	55.4
Camp Thorel	457	(26.1)	0.0	26.1	95.2
Domaine de Labourdonnais	590	(135.4)	34.0	101.4	92.6
PILOT REGIONS TOTAL	**6,892**	**(467)**	**154.1**	**312.8 Kg**	**75.6**
Other corporates growers					
Constance La Gaieté	788	(788)	0	788 Kg	57.0
Cie sucrière de St Antoine Ltée	1,745	(96.8)	0	96.8 Kg	78.6
Alteo Limited	536	(536)	0	536 Kg	N.A
Other Corporate growers TOTAL	**3,069**	**(1,421)**	**0**	**1,421 Kg**	**67.8**
GRAND TOTAL	**9,961**	**(1,888)**	**154.1**	**1,733.6 Kg**	**71.7**

5.1 PROJECT STEERING COMMITTEE

A Steering Committee, under the chairmanship of the Director of the Solid Waste Management unit of the Ministry of Environment and Sustainable Development and composed of representatives of the following organisations met at 6 months intervals to appraise progress:

1. Ministry of Environment, Sustainable Development, and Disaster and Beach Management.
2. GEF-SGP (UNDP)
3. Food and Agricultural Research and Extension Institute.
4. Mauritius Cane Industry Authority.
5. University of Mauritius.

6. Dangerous Chemical Control Board.
7. Chamber of Agriculture.
8. Ministry of Finance.
9. A representative of Domaine de Labourdonnais
10. A representative of La Ferme/St Martin Marketing Cooperative society.
11. A representative of Médine Camp de Masque Credit Cooperative Society.
12. A representative of Belle Mare Water Users Cooperative Society.
13. A representative of Surfrider Co. Ltd.

5.2 ANALYSIS OF PROJECT RESULTS

The average Farmers age for the 4 pilot regions was as follows:

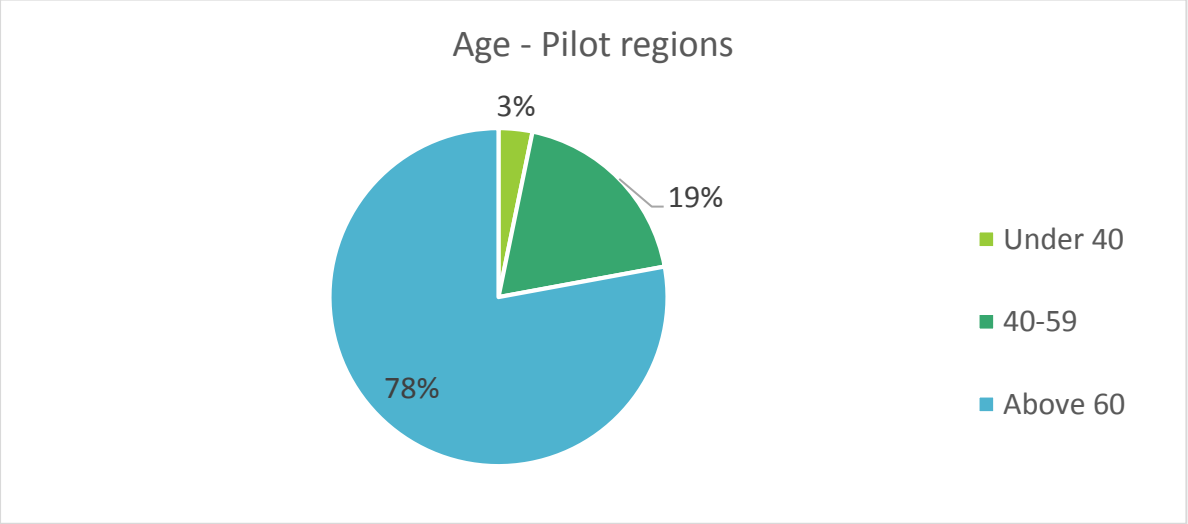


Figure 4. – Proportion of farmers in relation to age group

Figure 4 shows that 78% of farmers from the pilot regions were aged above 60 years old and only 3% of farmers were below 40 years old. 19% of them were between 40 to 59 years old.

5.2.1 GENDER PROFILE FOR 4 PILOT REGIONS

Figure 5 shows that the pilot regions comprise of 72% of male farmers and 28% of female farmers.

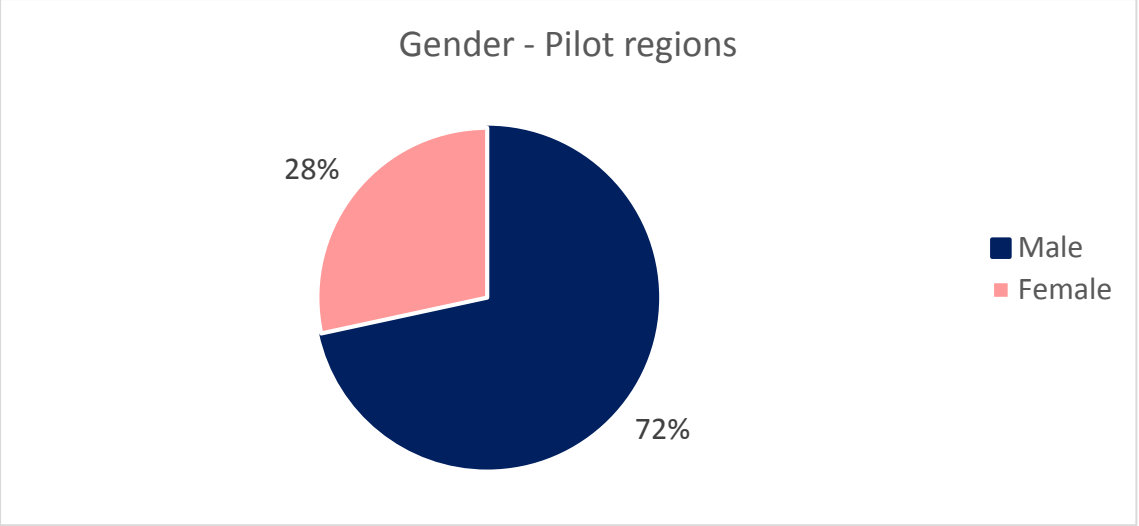


Figure 5. – Proportion of farmers in relation to gender

5.2.2 TOTAL QUANTITY OF EMPTY CONTAINERS GENERATED IN 4 PILOT REGIONS

Total quantity of containers generated since November 2015:

All four pilot regions :	6,892 units (467 kg)
Other voluntary corporate growers:	3,069 units (1,421 Kg)
GRAND TOTAL :	**9,961 units (1,888 Kg)**

5.3 RESULTS AND OBSERVATIONS ON EACH PILOT REGION

5.3.1 BELLE MARE ONION GROWERS

118 Farmers were invited to attend 4 group trainings and the turn-out was very low: 0%, 16.6%, 19.4 % and 21.2 % respectively. Farmers were reluctant to make themselves available after working hours to attend meetings, even when free transport was provided.

The measures taken by the project team to by-pass this situation was on the one hand to increase the number of site visits in order to meet the farmers individually and also to participate in group meetings organized by other stakeholders, like Cooperative Societies, Agrochemical dealers and FAREI.

There were some complaints concerning the location of the cages being too far from their fields. To remediate the situation, one cage was relocated and two additional cages were added to the site. A total of 7 cages were placed at Belle Mare for 118 farmers.

At one location, the cage was filled regularly with empty PET plastic water bottles. We suspected that it was coming from a neighboring hotel. A letter was sent to the hotel management to inform him about the project. The collaboration of the District Council was obtained for the removal of the

undesirable waste from the cages. A second board displaying the Do's and Don'ts was fixed on all cages as shown in plates 6, 7 and 8.

Plates 6, 7 and 8. – Unwanted waste in cage at Palmar cleaned up and new sign board

83% of farmers of the pilot region of Belle Mare were aged above 60 and 39 % of the population were female farmers as in figure 6.

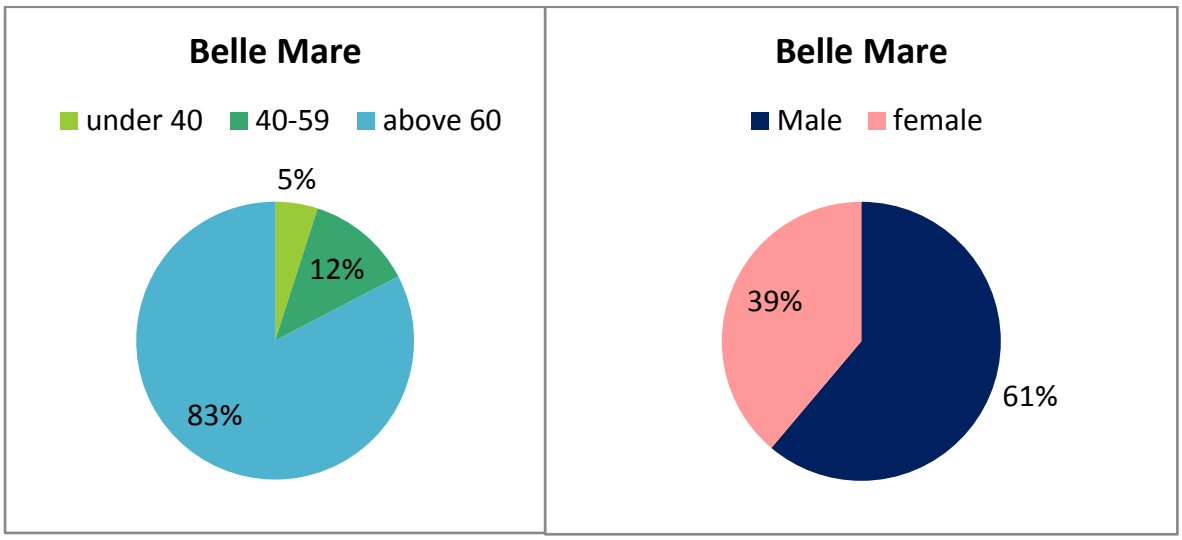


Figure 6. – Age and gender distribution of growers at Belle Mare

A total of 3,693 empty pesticide containers weighing 192.3 kg was collected at Belle Mare and 77.4 % of them had been triple-rinsed.

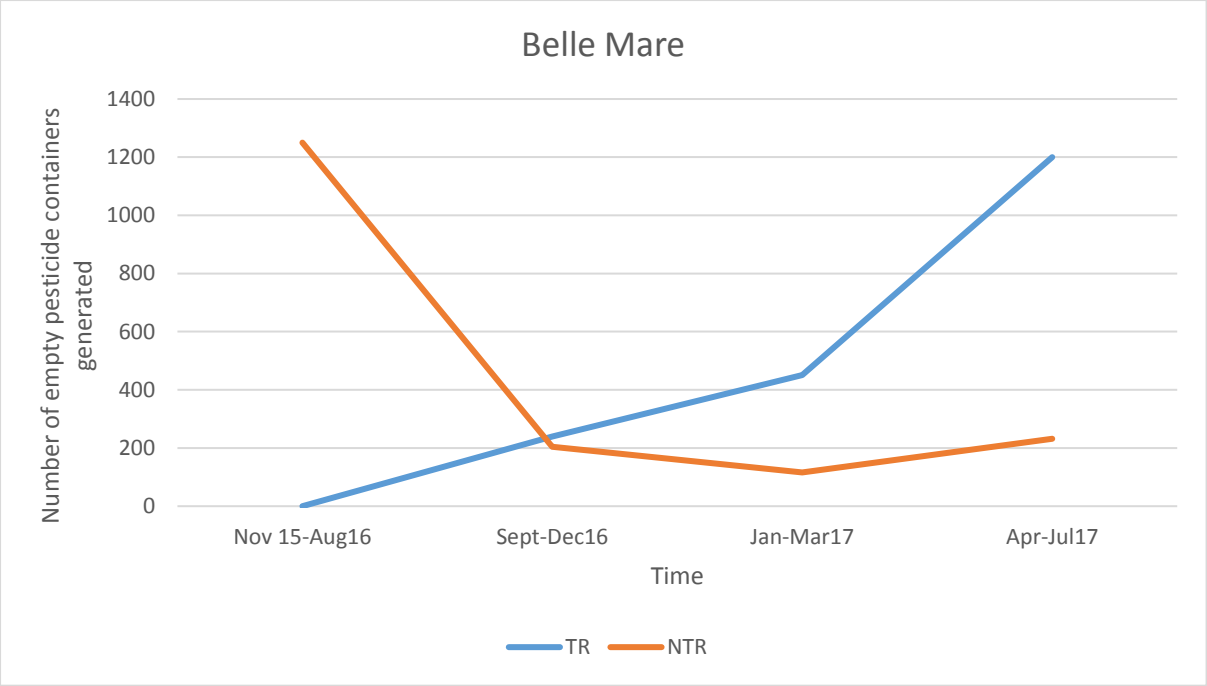


Figure 7. – Evolution of tripled rinsed (TR) and non- tripled rinsed (NTR) containers collected at Belle Mare

It can be noted from Figure 7 and 8 that there was an important increase in triple rinsed pesticide containers while that of non-triple rinsed containers showed a constant decrease.

From August 2016 to July 2017, there was a significant increase in the number of triple rinsed containers collected and a decrease in the number of non-triple rinsed containers. This indicated that the farmers using the cages, had understood and were adopting the triple rinsing technique gradually.

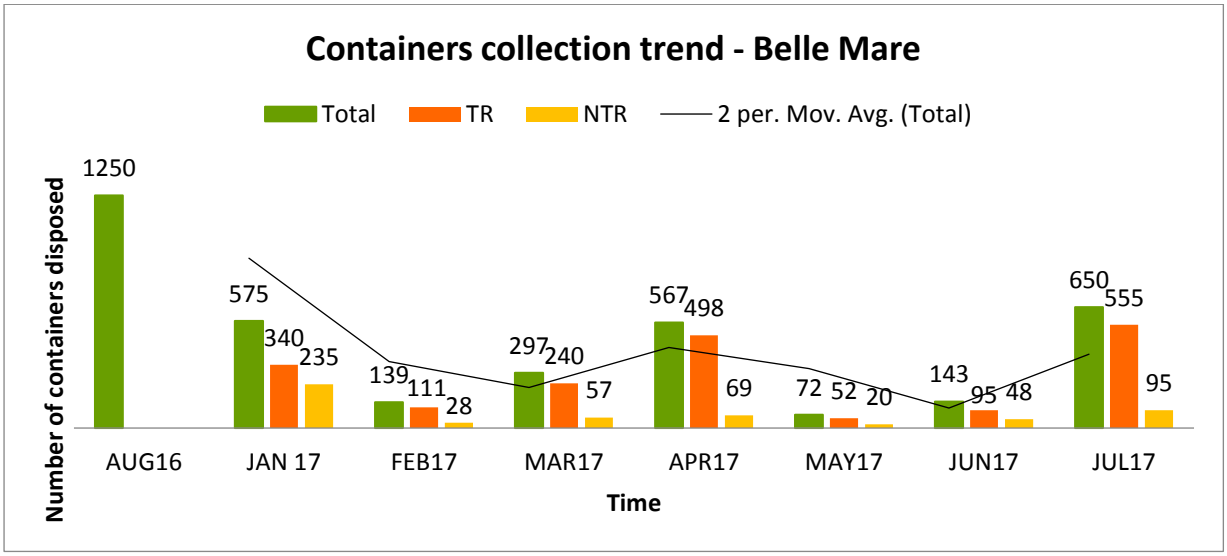


Figure 8. – Number of empty pesticide containers collected at Belle Mare

5.3.2 ST MARTIN PILOT REGION

Twenty-eight farmers were invited to attend 5 group trainings at St Martin. Farmers were often not available for such meetings. Many of them were part-time growers. The attendance rate ranged between 48.2% – 72.4%. There also, the cages were filled with all sorts of plastic wastes at first as illustrated in plates 9 and 10.

Plate 9. – Various plastic waste in cage at St Martin.

The cage had to be relocated at the back of the cooperative to restrict public access (Plate 11). Two cages were placed in the region for 38 farmers.

The project team obtained the collaboration of the Black River District Council for the removal of undesirable wastes from the cages and a second board displaying Do's and Don'ts was placed on the cages.

Plates 10 and 11. – Removal of waste and new location of bin at St Martin

Figure 9 indicates that 62% of farmers from the pilot regions were aged above 60 and only 7 % of the farmers were female.

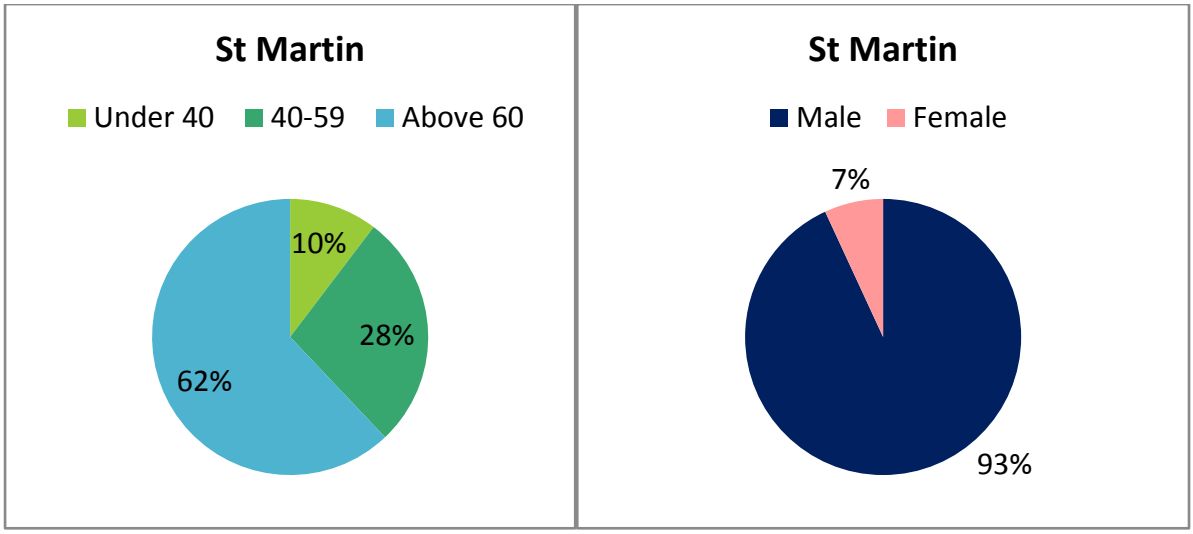


Figure 9. – Age and gender distribution of growers at St Martin

PROGRESSION OF TRIPLE RINSED CONTAINERS GENERATED AT ST MARTIN.

The region of St Martin generated a total quantity of 865 empty pesticide containers weighing 39.3 kg, out of which 66.2 % were triple rinsed.

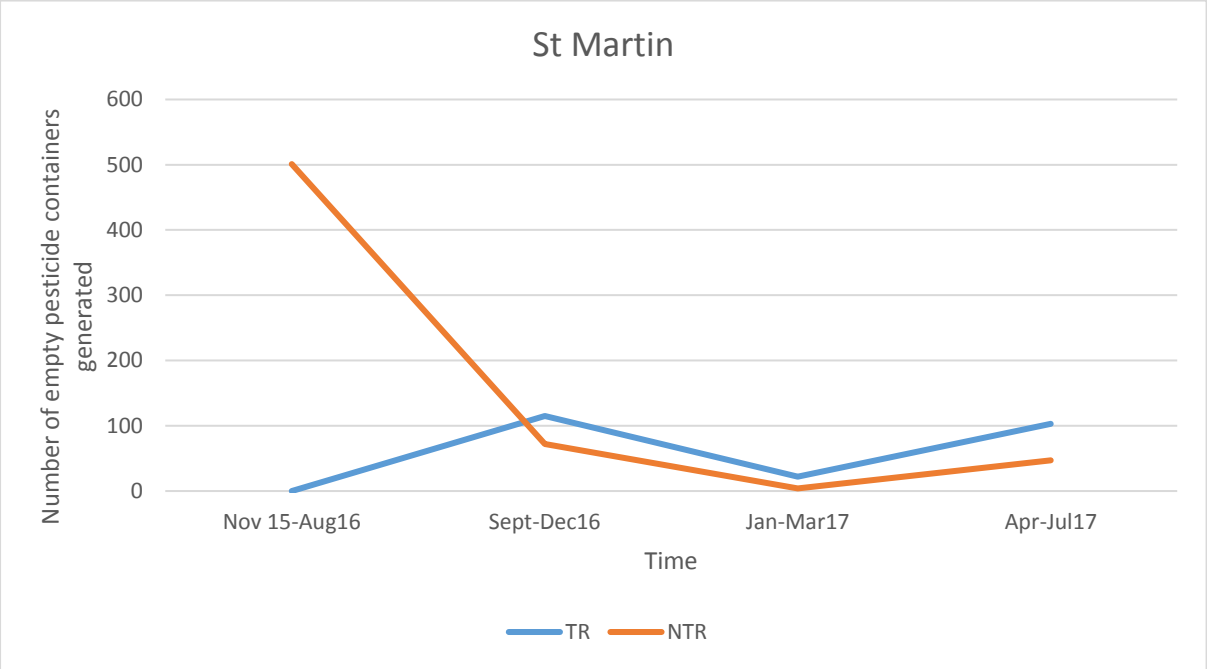


Figure 10. – Evolution of tripled rinsed (TR) and non- tripled rinsed (NTR) containers collected at St Martin

The number of containers collected and their distribution are given in figures 10 and 11.

From August 2016 to July 2017, the increasing trend in the triple rinsed containers and decreasing trend of the non-triple rinsed containers illustrates that the farmers had understood the concept and were triple rinsing their empty pesticide containers.

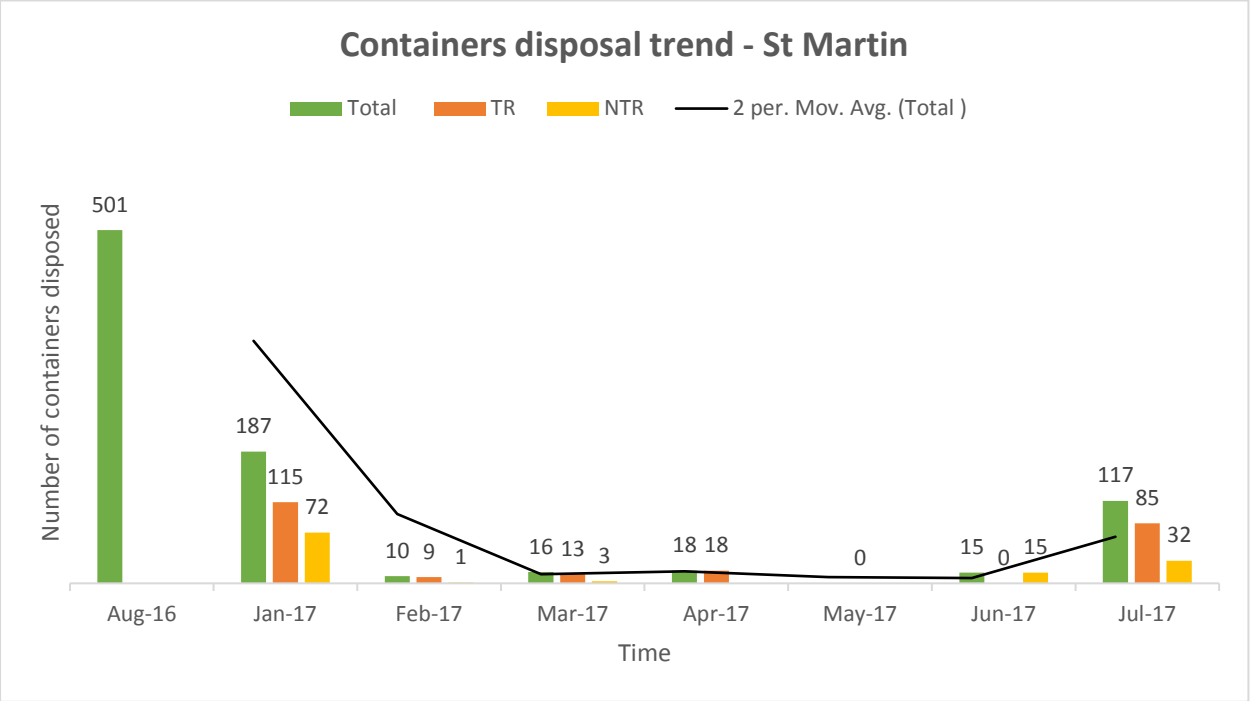


Figure 11. – Number of empty pesticide containers collected at St Martin

5.3.4 MÉDINE CAMP DE MASQUE COOPERATIVE CREDIT SOCIETY

Training

Seven group training sessions were held at Médine Camp de masque. Members of the cooperative were sugarcane growers which included many part-timers. Many of them could not attend the group trainings due to other commitments.

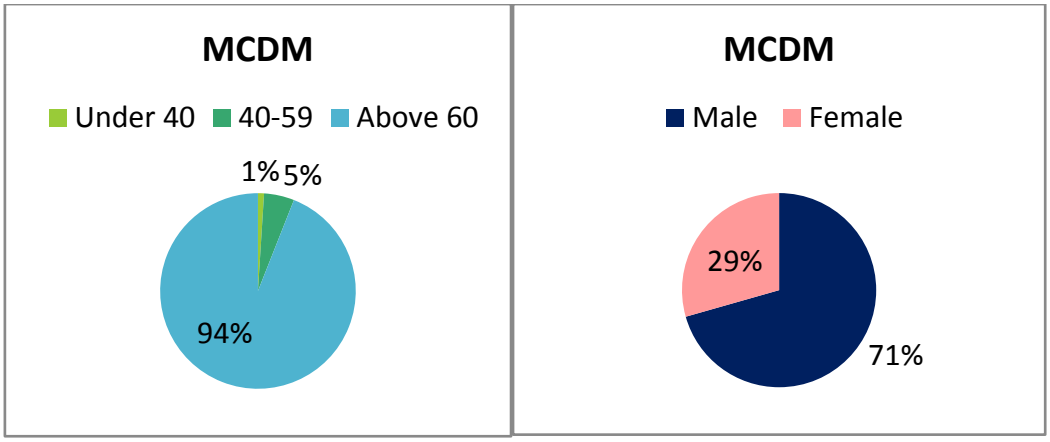


Figure 12. – Age and gender distribution of growers at Médine Camp de Masque

202 members of the cooperative, representing 50% of attendance, received training on triple rinsing. The age and gender distribution is given in figure 12. A total quantity of 1,031 empty pesticide containers were collected weighing 63.6 Kg and out of which 55.4 % were triple rinsed.

PROGRESSION OF TRIPLE RINSED CONTAINERS GENERATED

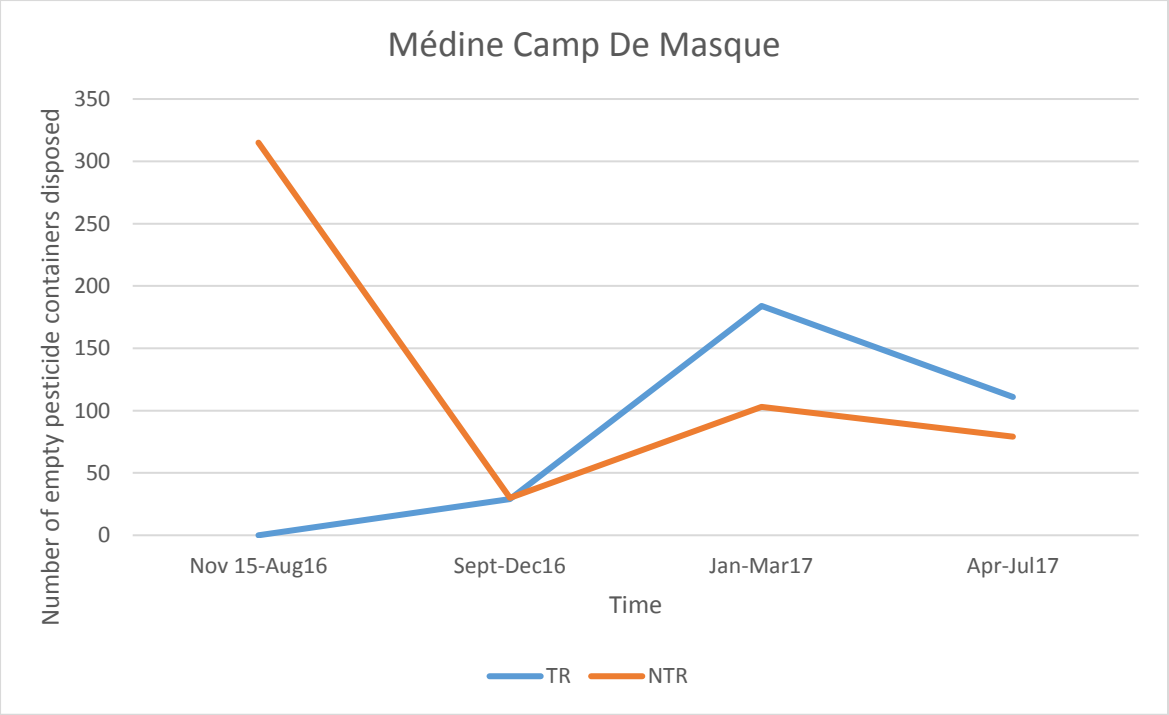


Figure 13. – Evolution of tripled rinsed (TR) and non- tripled rinsed (NTR) containers collected at Médine Camp de Masque

From August 2016 to July 2017, the increasing trend in the triple rinsed containers and the decreasing trend of the non-triple rinsed containers illustrates that the farmers have understood the concept and were triple rinsing their empty pesticide containers. This is illustrated in figures 13 and 14.

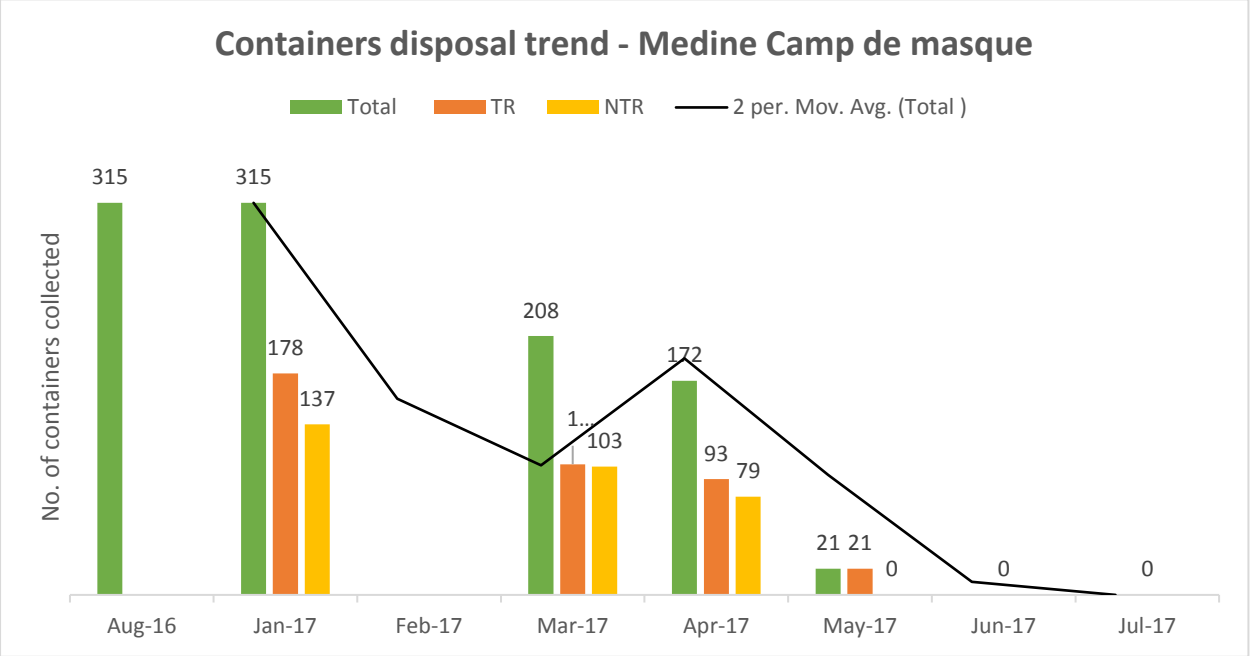


Figure 14. – Number of empty pesticide containers collected at Médine Camp de Masque

The chart below shows that at MCDM 58 % of field spraying was performed by hired workers and 34 % by the owners themselves as shown in figure 15.

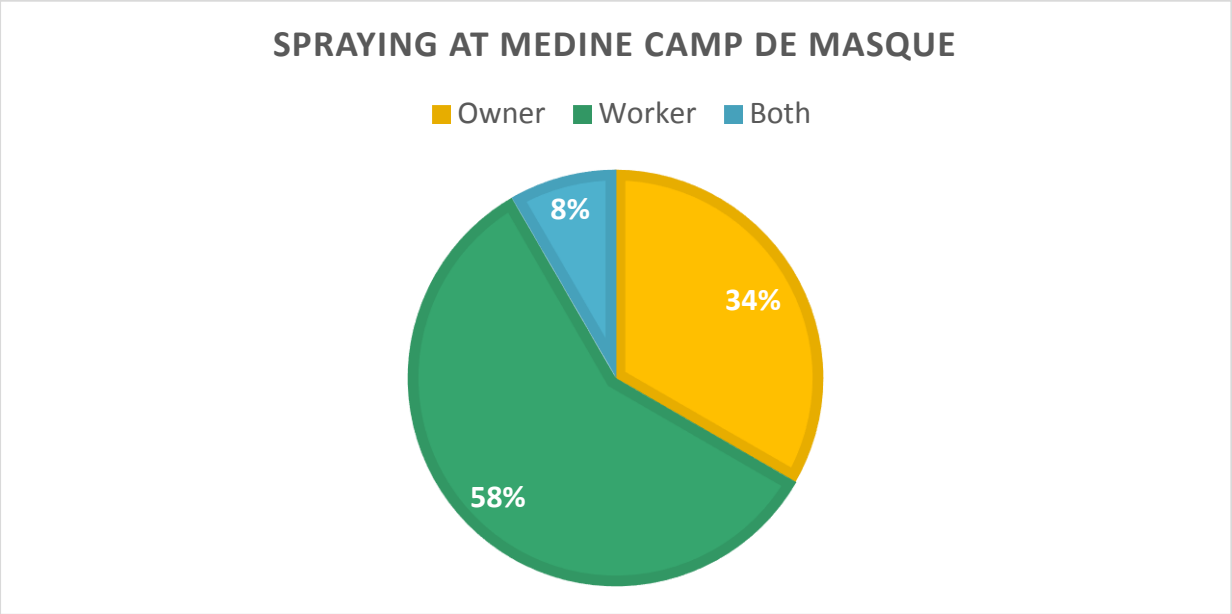


Figure 15. – Spray applicators at Médine Camp de masque

5.3.5 DOMAINE DE LABOURDONNAIS

Four group trainings were organised for 20 spray operators at Domaine de Labourdonnais (DDL); two training sessions were conducted in 2015 and two refresher training sessions in 2016.The spray operators and a representative of the management team of DDL followed the triple rinsing training. After a difficult start, whereby all sorts of wastes were being dumped in the cage, DDL management took appropriate corrective measures, including the installation of a water point and safety shower. The supervisory staff were instructed to monitor the whole operation.

From that time, onwards only pesticide containers were deposited in the cage and gradually most of the empty containers were triple-rinsed.

The pilot region of DDL generated a total quantity of 590 units of empty pesticide containers weighing 135.4 Kg and out of which 92.6 % were triple rinsed.

PROGRESSION IN TRIPLE RINSED CONTAINERS GENERATED

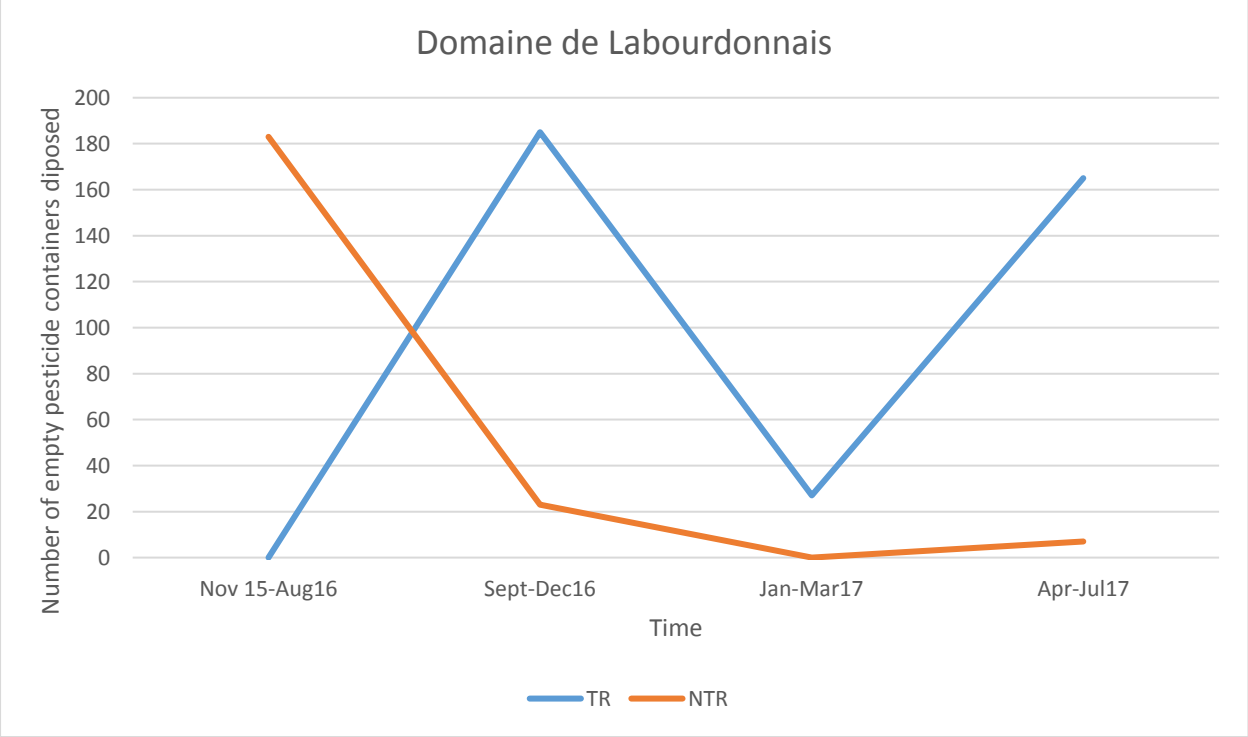


Figure 16. – Evolution of tripled rinsed (TR) and non- tripled rinsed (NTR) containers collected at Domaine De Laboudonnais

From August 2016 to July 2017, the increasing trend in the triple rinsed containers and the decreasing trend in the non-triple rinsed containers illustrates that the spray operators and their supervisors have understood and were triple rinsing their empty containers. This is illustrated in figures 16 and 17.

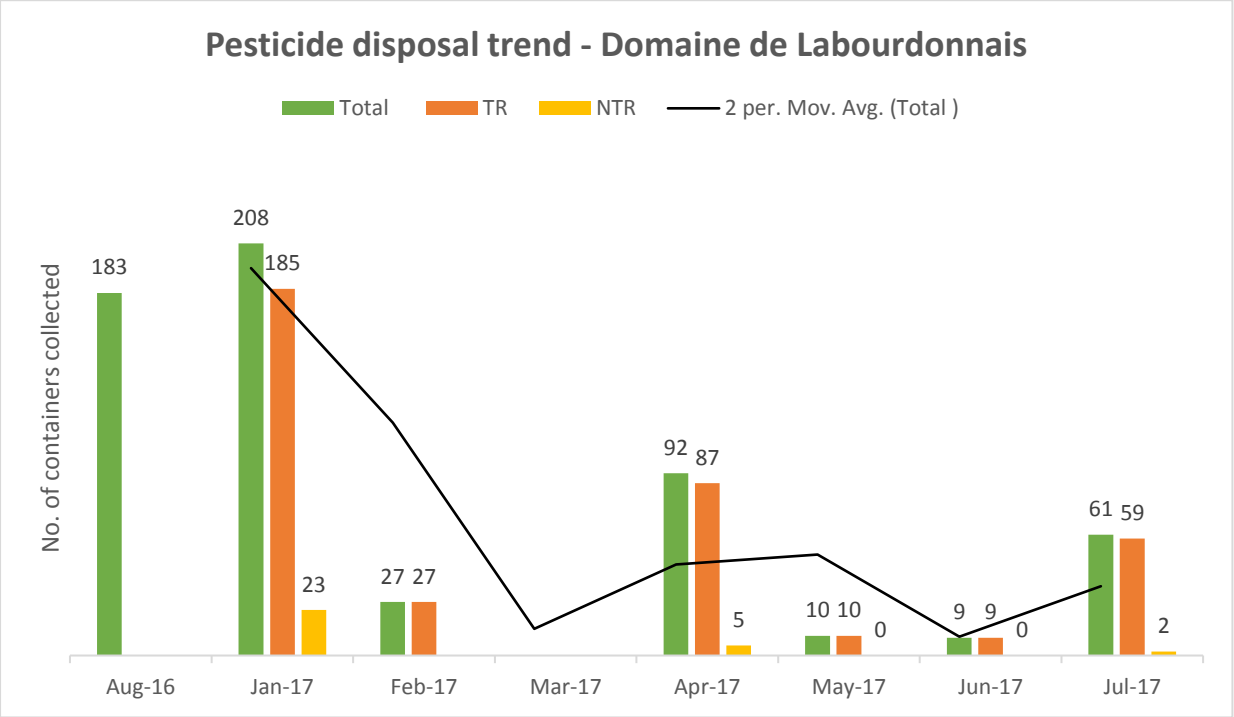


Figure 17. – Number of empty pesticide containers collected at Domaine De Labourdonnais

5.4 SURVEY RESULTS

An independent team made up of the sales staff of CropLife members conducted a survey, in May 2017, based on a questionnaire prepared by the Project Monitoring Committee.

The aim was:

- To cross check information collected by the Container Management team.
- To find out whether Core farmers have grasped the concept of safe disposal, triple rinsing and collection for recycling.

From the survey, it was noted that most farmers stated that they **triple-rinsed** their containers which did not always reflect the reality. Some Farmers stated that they rinse their containers once or twice. Other Farmers claimed that they triple rinsed mainly the containers of very expensive products.
The most frequent explanation for not triple rinsing was lack of time. Figure 18 summarizes the information on frequency and number of rinsing done.

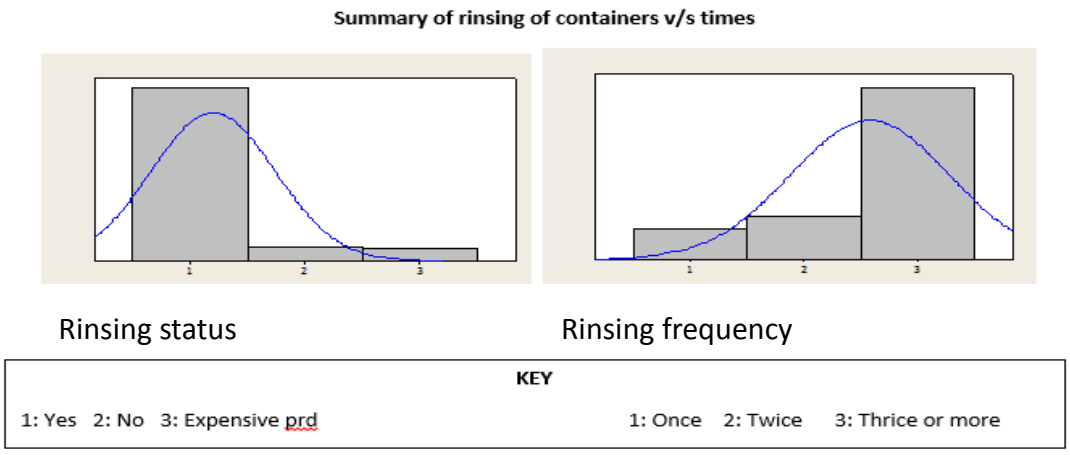


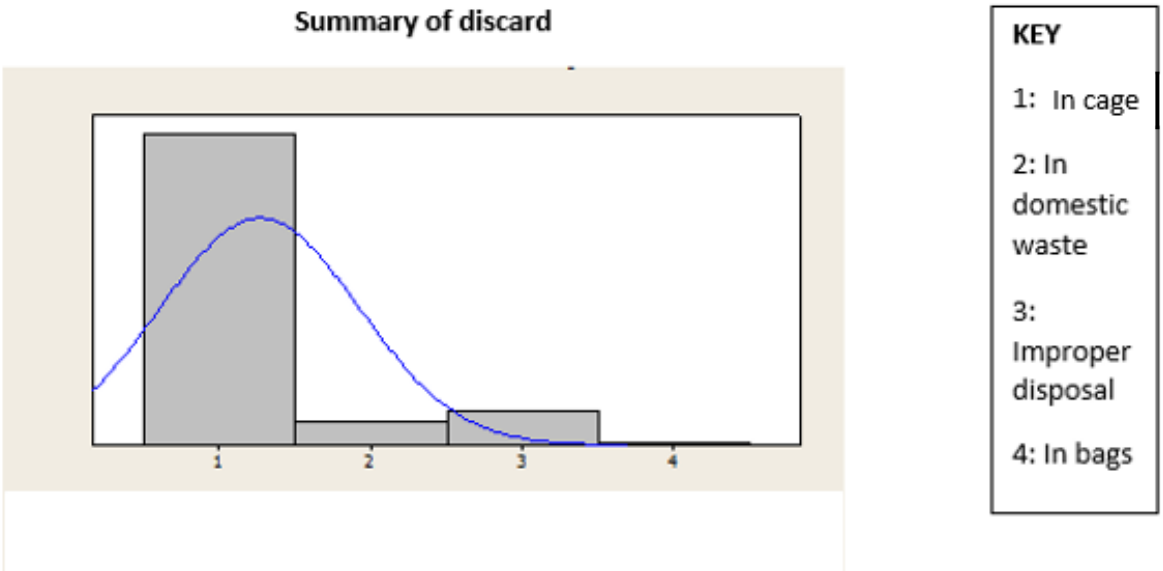
Figure 18: Rinsing status and rinsing frequency of empty containers.

According to the survey, most farmers said that they were discarding their empty containers in the collecting cages (figure 19).

Comments obtained from the survey also indicated they had not yet used the cages because:

- their pesticide containers were not empty yet.
- the bins were located too far from their field.

Farmers have grasped the notion of triple rinsing and safe disposal but adoption of the concept in their day-to-day activities remains slow.



According to the recycler, only 5- 10 % of plastic obtained from the processing of the empty containers were mixed with other raw materials to produce a range of recycled products (Plates 12 and 13). Hence an estimated total of 8,000 kg of recycled products were produced with the 606 Kg delivered.

Plates 12 and 13: Recycled products made from empty pesticide containers

6.1 RECYCLING: DIFFICULTIES ENCOUNTERED

There was an erratic pattern of disposal of empty pesticide containers in collecting cages which resulted in collection and transport logistic problems for the recycler.

During the early phase of the project, non-triple rinsed containers were found in the cages.

The remote geographic locations of the pilot project sites complicated collection planning.

The problems were addressed by the Project Monitoring Committee and following discussions with the recycler, a new collection and transport system was put in place, whereby only clean containers would be delivered to the recycler and CropLife members would assist in the transportation of the empty pesticide containers from pilot sites to the recycler.

7.0 GENERAL OBSERVATIONS

46 % of the total estimated empty containers generated in the 4 pilot project areas were collected in the cages.

All containers collected were inspected visually by the project field staff and 75.6 % of the collected containers were free from pesticide residues and assumed they had been triple-rinsed.

Corporate growers - According to our estimates, large sugar estates generate 50 % of the total amount of plastic containers. (19,178 Kg. / 37,600 Kg. – 50.99 %).

Results obtained from the corporate site (Domaine de Labourdonnais) in the pilot project indicate that once management commitment is obtained, progress is very rapid, reaching 92.6 % triple-rinsed containers in the collecting cage. It is expected that with a good awareness campaign towards the management of large sugar estates, there would be a significant response at national level.

Incentive – Although most of the farmers trained and surveyed claimed that they had understood the need for triple rinsing, the adoption process was slow. Observations made from the reward scheme introduced, indicate that a suitable incentive scheme could accelerate adoption and hence bridge the gap.

It is to be noted that the enforcement of existing legislation could also induce a more rapid adoption of triple-rinsing and safe disposal into dedicated collecting cages.

Collection and recycling

The findings of the pilot project indicate that whichever way we expand the project we are bound to have an amount of non-triple-rinsed containers to deal with. The country must be able to cater for non-triple rinsed containers over a period of time.

Storage and export could be a costly option. It would be advisable to rather invest in a well-thought program which will make farmers more responsible towards the environment through the conversion of their hazardous waste into non-toxic recyclable ones.

8.0 RECOMMENDATIONS

1. It would be very advantageous to up-scale the project to National Level immediately, so as not to lose momentum.

2. An upscaling in phases would be advisable for economic and management reasons.

3. FAREI would be the best organization to coordinate the up-scaling process with the collaboration of other stakeholders, such as the Solid Waste Division of the Ministry of Environment, the Dangerous Chemicals Control Board, the Mauritius Chamber of Agriculture, the Farmers Service Centers of the Ministry of Agriculture, the Village Councils, the Ministry of Cooperatives, the Ministry of Local Government and a recycler.

4. We would strongly recommend that due consideration be given to :

    i. The Integration of 'triple-rinsing' and safe disposal of empty pesticide containers in GAP programs, e.g. MAURIGAP and the introduction of a farmer's card (green card) which could serve to enlist growers who adhere to the triple rinsing technique and safe disposal of empty pesticide containers and also for traceability purposes.

    ii. Working in priority with farmers' organisations having a Fairtrade certification

    iii. The introduction of a suitable incentive scheme in order to kick-start the national project (see report on Brazil's success story in annexure)

    iv. A comprehensive national sensitization campaign enhancing general awareness on environmental hazards.

5. Enforce existing legal provisions against inappropriate disposal of hazardous wastes – Environment Protection Act 1991 – Government Notice No 157 of 2001 'Standards for hazardous wastes' Regulations 2001.

6. Ensure that the appointed recycler is properly equipped to store and process the plastic waste supplied and that there is an undertaking that the recycler will only make specified products out of the recycled material.

7. Rationalise collection points & address the issue of the financing of transport costs.

9.0 CONCLUSION

The pilot project leads us to conclude that a national empty pesticide container management program is feasible. Adequate resources should be made available rapidly. The program based on a multi-stakeholder approach, coordinated by a single organization having extension skills with farmers can be a success story.

10.0 ACKNOWLEDGEMENT

- Croplife Mauritius wishes to express its gratitude to the following stakeholders for their valuable contribution during the project :
- Chairperson and members of the Steering Committee
- Project stakeholders:
- UNDP GEF SGP and CropLife International
- CEO and management team of FAREI and MCIA
- Representatives of cooperative societies in pilot regions and MD & management team of Le Domaine de Labourdonnais
- Resellers of pesticides in pilot regions
- Recycler – Surfrider Limited
- Project director (Clifford Dove), Project Leaders (Mukesh Rughoo, Weena Ramen), Project Consultant (Serge L'Ecluse), Technical assistants (Giresh Mungla and Treepty Unnoop)
- Members of Project Monitoring Committee (Clifford Dove, Serge L'Ecluse, Dani Joseph, Stephanie Pacifique, Weena Ramen)
- CropLife executive members
- Field officers from member companies

LIST OF ANNEXURES

Annexure	Description
Annex 1	MOU with pilot regions – St Martin, La Ferme, Belle Mare, DDL
Annex 2	MOU CropLife - Surfrider
Annex 3a	Minutes 1st Steering Committee meeting
Annex 3b	Minutes 2nd Steering Committee meeting
Annex 3c	Minutes 3rd Steering Committee meeting
Annex 3d	Minutes 4th Steering Committee meeting
Annex 4	Calendar of group training and awareness
Annex 5	Triple rinsing leaflet distributed
Annex 6	Photographs of communication material and events
Annex 7	Template certificate of attendance
Annex 8	Mission report and recommendations following second visit to Rodrigues Island
Annex 9	Estimate of total amount of empty pesticide containers generated yearly in Mauritius
Annex 10	Brazil Leads World in Container Management_CropLife International
Annex 11	Pamphlet on Maurigap
Annex 12	Information on Fair Trade
Annex 13	Government notice No 157 of 2001 – The Environment Protection Act 1991
Annex 14	Environment Guideline No 14 – Pesticide formulation and packing
Annex 15	MOU CropLife - FAREI