ANNEX 3

PROJECT: STDF/PG/381

"COCOASAFE": CAPACITY BUILDING AND KNOWLEDGE SHARING IN SPS IN COCOA IN INDONESIA

FINAL REPORT
Indonesia

INDONESIAN COFFEE AND COCOA RESEARCH INSTITUTE (ICCRI)
APRIL 2016

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PROJECT INFORMATION

Title: COCOASAFE: CAPACITY BUILDING AND KNOWLEDGE SHARING IN SPS IN COCOA IN SOUTH EAST ASIA - INDONESIA
Implementing Agency: INDONESIAN COFFEE AND COCOA RESEARCH INSTITUTE (ICCRI)
Partners: • INTERNATIONAL COCOA ORGANIZATION (ICCO); • CENTRE FOR AGRICULTURE AND BIOSCIENCES INTERNATIONAL (CABI); and • STANDARDS AND TRADE DEVELOPMENT FACILITY (STDF).
Start Date: 27 NOVEMBER 2013
End Date: 20 NOVEMBER 2015
Beneficiary: COCOA FARMERS AND OTHER WORKERS INVOLVED IN COCOA PRODUCTION, AND THEIR COMMUNITIES.
Budget: Project value: US$291,008 STDF contribution: US$205,065

LIST OF ABBREVIATIONS

ACIAR	: Australian Centre for International Agricultural Research
CoEX	: Cocoa of Excellence
CPB	: Cocoa pod borer
DWPE	: Detention without physical examination
EC	: European Commission Regulation
EPA	: Environmental Protection Agency
EU	: European Union
FFA	: Free fatty acid
FDA	: Food and Drug Administration
FFS	: Farmer Field School
GAP	: Good agricuture practices
GOI	: Government of Indonesia
ICCO	: International Cocoa Organization
ICCRI	: Indonesian Coffee and Cocoa Research Institute
IPDM	: Integrated pest and disease management
LOD	: Limit of detection
MOTRAMED	: Mediation Partnership Model
NGO	: Non-governmental organization
NSC	: National Steering Committee
OTA	: Ochratoxin A
PAHs	: Polycyclic aromatic hydrocarbons
PEA	: Project Executing Agency
PPR	: Phytophthora pod rot
MRLs	: Maximum Residue Levels
SNI	: Standard Nasional Indonesia Koko (Indonesia Standard on Cocoa Bean)
SPS	: Sanitary and Phytosanitary
STDF	: Standards and Trade Development Facility
TOF	: Training of Facilitator
TOMF	: Training of Master Facilitator
VSD	: Vascular-streak dieback
WCF	: World Cocoa Foundation
WCR	: World Coffee Research
USDA	: U.S. Department of Agriculture

1. EXECUTIVE SUMMARY

This project titled 'CocoaSafe': Capacity Building and Knowledge Sharing in SPS in Cocoa (STDF/PG/381) was implemented in Indonesia as a joint project between Indonesian Coffee and Cocoa Research Institute (ICCRI) and CABI. The main aim of the project is to train facilitators on safety concerns to improve cocoa productivity and sustainability in Indonesia, and the overall goals are to:

(i) Improve the quality of cocoa through capacity building in SPS;
(ii) Promote and facilitate knowledge sharing between stakeholder groups participating in the project; and
(iii) Raise awareness among cocoa stakeholders on food safety concerns in the whole supply chain (and how to address them).

The project adopted a collaborative regional approach. The Indonesian Coffee and Cocoa Research Institute (ICCRI) is the lead national agency representing the cocoa producing country and industry country of Indonesia, and the Malaysian Cocoa Board (MCB) representing Malaysia. The advisory body for the project is the International Cocoa Organization (ICCO) while CABI took on the role of the Project Implementing Agency (PIA), responsible for project management and coordination.

The activities were carried out during the project lifespan (27 November 2013 to 31 April 2016), and could be categorized into these major components: (1) Formation of the national steering committee (NSC); (2) Development of locally adapted training syllabus; (3) Training of Master Facilitator (TOMF); (4) Training of Facilitator (TOF) for farm leader and local extension, agro-dealers and processor; (5) Training in best practices in postharvest; (6) Project impact survey; and (7) Development of a website to disseminate agricultural and food safety standards. Dissemination and sharing of knowledge on good practices in SPS and food safety was a key element running through all the out project activities i.e. publicity campaigns, training and knowledge-sharing approaches targeting the various actors of the cocoa value chain.

The National Steering Committee (NSC) was formed by staff from ICCRI and oversaw project implementation. The NSC held regular meetings to monitor activities, collect issues, review and recommended solutions or interventions to address major problems affecting the running of the project.

The CocoaSafe training syllabus was adapted from the CABI training manual to fit local farm management practices, application of GAP and SPS, and translated into Bahasa Indonesia. Topics on recommended cocoa planting materials in Indonesia, shade management, diversification system, soil fertility and health, pest/disease management, cocoa safety and quality standard of cocoa bean, and ICCRI's standards and recommended best practices were also included in the manual. The manual for the Training of Master Facilitators (TOMF) (ISBN: 978-979-8745-23-2) is entitled, "Panduan Pelatihan: Pelatihan Fasilitator Utama". The training of master facilitators (TOMF) was attended by 20 participants, and held at ICCRI, Jember (15-25 September 2014). The master facilitators subsequently implemented a series of training of facilitators (TOF) for local extension and farm/cooperative leader, agro-dealers, trader/processor in selected regions of cocoa growing areas / developing cocoa growing areas. TOF training manuals and information posters were also produced and printed for the participants. TOFs for local extension and farm/cooperative leaders were conducted in South Sulawesi (4-12 January 2015), Southeast Sulawesi (14- 22 December 2014), West Sulawesi (6-15 January 2015), West Sumatra (15-22 December 2014) and East Java (4-12 January 2015). 20 participants attended each training event. TOFs for agro-dealers were carried out in West Sulawesi (13-18 April 2015) and West Sumatra (20-27 April 2015). TOFs for Trader/Processor were conducted in Central Sulawesi (2-7 June 2015), South Sulawesi (8-13 June 2015) and Lampung (8-14 June 2015). A total of 500 participants attended the TOMF and TOF events. Participants were given additional copies of the training manuals and posters to hand out to other stakeholders in the cocoa supply chain.

A separate component on capacity building in Good Agricultural Practice (GAP) was a key element in the CocoaSafe project in Indonesia. This initiative focused on improvements in plant and human health, the latter through better-targeted use of agrochemicals minimize harmful contamination of soil and water. The projects also raised awareness of contamination of food crops by heavy metals, pesticide residues and aflatoxins.

Results from the impact survey indicated that the TOFs for farmer leaders improved farmers' knowledge on GAP, pest and disease control, and safe use of pesticide. Consequently, it was also increasing the

selling of pesticide and fungicide. The TOFs for agro-dealers increased retailers' awareness on regulations on sale of pesticides. TOFs for agro-processor improved knowledge on the cocoa storage systems compliant with SPS standards.

A project website was created to share information and related materials on the CocoaSafe project in Indonesia. It can be accessed through: http://www.cocoasafeindonesia.id/.

The project also facilitated stakeholder linkages with both private enterprises and public organizations, to make the whole approach to food safety in cocoa more cohesive. Linkages were established with other STDF projects such as, "Beyond Compliance and SPS Capacity Building in Africa to Mitigate the Harmful Effects of Pesticide Residues in Cocoa and to Maintain Market Access", and private sector initiatives as Mars Inc. and Crop Life under the "Sustainable Cocoa Initiative program" in Indonesia. The "Sustainable Cocoa Initiative" program includes workshops on pesticide reduction (pest management, breeding for pest resistance, training in rational pesticide use), and trainings on bean drying and Rainforest Alliance and UTZ Certification processes.

2. BACKGROUND

Cocoa is the most important commodity for rural community development and economic growth in cocoa producing countries such as Indonesia, Malaysia and Papua New Guinea. In Indonesia, the contribution of cocoa to national income is the third largest in term of agricultural product after oil palm and rubber in the value of $ 1,410 billion. More than 1.5 million farmers' livelihoods depend mainly on cocoa production. Indonesia is the world's third largest cocoa producer and exporter, after Côte d'Ivoire and Ghana. In 2014, the estimated production area stood at 1.65 million ha with a production volume of 710,000 tons, of which 87% produced by smallholder farmers. Sulawesi is the main cocoa-producing area (966,000 ha, representing about two thirds of the country's output), while the remaining production areas are spread between Sumatra, Java, East Kalimantan and Papua, and to a lesser extent Bali, Flores and other islands. Exports from Indonesia include fine flavor cocoa (i.e. Java Cocoa) renowned for its unique flavor and aroma and sought after to produce specialty chocolates. Most of the cocoa produced however is a bulk cocoa of moderate quality, destined for the North American, Latin America, European Union (EU) and Asia-Pacific markets.

Indonesia has the potential to produce high quality bulk cocoa: the cocoa produced in the West Sumba of Nusa Tenggara Timur was recently awarded the 2015 Cocoa of Excellence (CoEX) in Paris. Importantly, after the Government imposed an export tax on cocoa beans in 2010, the export volume decreased significantly as the beans are mostly used for domestic consumption of intermediate product. In 2014, the domestic utilization of cocoa bean increase from 50% to 75% then impact to decreasing of cocoa bean export in negative growth rate of -29% per year.

The overall development goal of this project is to produce and trade cocoa that meets food safety and international SPS standards. This include (i) improving the quality of cocoa through capacity building in SPS, (ii) promoting and facilitating knowledge sharing between stakeholder groups participating in the project, and (iii) raising awareness among cocoa stakeholders beyond the project's immediate reach on food safety concerns in the whole supply chain (and how to address them). The stakeholders targeted by this project include smallholders, extension services, producers, agro-dealers, processors and exporters, and national and regional regulatory / research agencies.

Most of the cocoa in Indonesia is produced by smallholder of farmers, with typically low productivity and less standardization of bean quality. In these systems, best practice is rarely applied on cocoa production. Input suppliers include small retails where agro-dealers sell inputs for a range of crops depending on the locality. Agro-dealers at kiosk outlets are excellent intervention points in the cocoa value chain for improving knowledge and training capabilities to improve best practices in SPS issues, relating to pesticide use in particular. They may have been trained in the related issues, but this is likely to have been from a chemical company, and not specific to cocoa. Local collecting and bulking by collectors and traders is followed either by local processing or export by local and multinational exporters.

Sources of contamination during the production stage, drying, storage (postharvest storage, collection by local traders, exporters and processors), and processing are described below. Decline in quality or introduction of contaminants can occur at several stages of the supply chain, from natural sources, on-farm practices, or during storage, processing and manufacturing. All stakeholders in the chain, including both those involved in production and those involved post-harvest, therefore need to be aware of the regulations and standards of food safety that cocoa must comply with to allow access to final markets. This project aims to target key intervention points in the chain to minimize the risk of introduction of these contaminants and defects.

The important production constraints in Indonesia and others SE Asia are mainly cocoa pod borer (CPB), Phytophthora pod rot (PPR) and vascular-streak dieback (VSD) as the biggest pest and disease problems on cocoa farming. CPB has had a devastating impact on cocoa production in Indonesia: by 2000 it had infested 60,000 ha, causing yield losses worth approximately US$40 million per year. In Malaysia, a severe attack of CPB in 1990 led to a decrease in production from 247,000 MT to 200,000 by 1993 and was one reason for the virtual disappearance of cocoa from Peninsular Malaysia during the 1990s. The first recording of VSD was in the 1960s in Papua New Guinea, causing severe losses in yields, but was eventually brought under control by the development of resistant planting materials. In recent years, VSD has re-emerged as a major problem for farmers and phytosanitary authorities, adding a further challenge to the sustainability of cocoa production in the country. It is now present in all cocoa-producing countries in Asia and the Pacific and is also a major problem in the commercial plantations in West Malaysia and

Sabah. Recently, it has become a major concern for phytosanitary authorities in Indonesia, were the disease is widely spread in Sulawesi and into the fine flavour cocoa producing region in East Java.

As cocoa pests and diseases continue to be a major challenge for production, the use of pesticides (fungicides, herbicides, insecticides) remains the most effective method for controlling the problems. Measures are therefore needed to the levels of harmful substances in cocoa products arising from the use of pesticides, particularly as cocoa-producing countries face potential trade barriers as a result of increasing numbers of legislative and regulatory measures on SPS standards on food safety, enacted by cocoa-consuming countries. Contaminants are of great concern for both importing countries and exporting parties, as ever more stringent limits are applied. Developing capacity in conforming to SPS and imposed maximum contaminant levels is now a priority in many developing countries, especially in the context of accessing high value markets in the developed world.

To regulate pesticide residues on imported produce, standards set by Codex Alimentarius can be used as a reference for international trade (a database containing Codex Maximum Residue Limits for Pesticides, and for a commodity or a group of commodities). Key markets the EU, USA and Japan define their own maximum residue levels (MRLs), setting limits of tolerance. Since 1st September 2008 Regulation (EC) No 396/2005 of the European Parliament and of the Council on MRLs determined that any foodstuff, including cocoa as an imported commodity, containing pesticide residues above MRLs is considered illegal in the EU and can be blocked at import. cocoa bean and cocoa product consignments entering the EU are routinely checked for chemical residues by national authorities. MRLs for cocoa are in most cases set at the limit of detection (LOD) of the analytical method or at a default level of 0.01 mg/kg. For example, in 2007 a shipment of cocoa butter from Indonesia was refused entry into the Netherlands due to levels of methyl bromide residues exceeding a set EC MRL.

Access to Japanese markets is also a concern for exporters in the project countries, with legislation on MRLs in effect since May 2006. Since the 'positive list system' was introduced, several consignments of cocoa beans have been denied entry due to exceeding MRLs. This system also placed an MRL of 0.01 ppm as a uniform limit, unless a higher level is published. In the USA, the Food and Drug Administration (FDA) enforces pesticide level tolerances on all foods (tolerances developed with the Environmental Protection Agency). Tolerances for cocoa beans are set and exceeding these can result in detention without physical examination (DWPE) of future lots, delaying importation significantly. Japanese and US MRLs are largely in line, with MRLs for beans as follows: the fungicide chlorothalonil (0.05 ppm), the pesticide synergist Piperonyl butoxide (8 ppm), residues from methyl bromide (50 ppm) and Sulfuryl fluoride (0.2 ppm) fumigation and herbicides paraquat (0.05 ppm) and glyphosate (0.2 ppm). The EC MRLs for fermented beans vary from these values, by up to two-fold in those for which MRLs are available. Generally, where no MRL is published each importing market adopts a default level of 0.01ppm.

In addition to pesticides, a major food safety concern in cocoa is contamination with fungal toxins (mycotoxins) during post-harvest processing and storage of beans. Among the mycotoxins, aflatoxins and ochratoxin A (OTA) are of special concern owing to their high occurrence and toxicity. Contamination can occur in at many critical points in the cocoa production chain. European food safety legislation on mycotoxin levels is becoming ever stricter. The presence of mycotoxins can be viewed as a failure in pest management, and as such is avoidable through good practice.

Other food safety concerns are the infestation of cocoa shipments with insect pests. The presence of live insects in cocoa entering the US market led the FDA to introduce a legislation imposing automatic detentions on shipments from Brazil, Indonesia and Malaysia without physical inspection. The introduction of such legislation had a negative impact for export from the aforementioned countries, as additional time required to fumigate and pass FDA inspection at US ports increased significantly the costs and decreased the competitiveness of Indonesia cocoa bean exports; according to the World Bank, the automatic detention imposed additional cost of US$ 200 per tonne, representing approximately 16% of the unit import price of Indonesian Cocoa beans in 2005. After a series of bilateral discussions between Indonesia and the US, the FDA lifted the automatic detention of cocoa from this origin. Despite this, on 7 March 2012, FDA issues a related Import Alert NO 34-01, forcing the "Detention Without Physical Examination of Cocoa Beans from Brazil and Indonesia Due to Presence of Live Insects" (http://www.accessdata.fda.gov/cms_ia/importalert_106.html).

Infestation of cocoa shipments with insect pests is another concern, and the presence of live insects has led to an order for DWPE on shipments of cocoa beans to the USA from Indonesia, Malaysia and Brazil.

This order was triggered by infestations in the early 1990s, and following bilateral discussions between Indonesia and the US on the framework of trade and investment facilitation, the FDA ended the automatic detention of cocoa. However, on 7 March 2012, FDA issued a related Import alert which reintroduced this measure.

Heavy metal contamination can arise from the environment, industrial activities or from food processing. Sources include agrochemicals such as fertilizers, exposure to leaded gasoline (from drying cocoa along the roadside), as well as from natural sources (e.g. volcanic soils). There is a tendency for heavy metals from anthropogenic activities to be more soluble in water and therefore have a higher availability for uptake by plants (of particular note are lead, cadmium and aluminium). Australian legislation already requires that chocolate and other food preparations containing cocoa undergo screening for cadmium. Maximum levels are set by European Commission Regulation (EC) 1881/2006, which is likely to be amended soon because of concerns among EC member countries about cadmium levels in chocolate and cocoa products.

Contamination by polycyclic aromatic hydrocarbons (PAHs), many of which are carcinogenic, can result from inefficient or poorly maintained diesel dryers used to dry cocoa beans. Another concern is contact of cocoa beans with jute bags contaminated with mineral hydrocarbon batching oil, which is also carcinogenic.

Poor post-harvest handling can compromise quality as well as safety. The quality of raw cocoa beans and cocoa butter depends on their free fatty acid (FFA) content: high FFA content is a serious quality defect and reduces technical and economic value. FFA content is influenced by many factors including humidity, infestation and oxygen, so poor storage management can be responsible for high levels.

3. PROJECT GOAL / IMPACT

The overall goal of this project is to ensure production and trade of cocoa that meets food safety and SPS standards. As with other foodstuff, consumers of cocoa and cocoa products worldwide are increasingly aware of the use of potential harmful chemicals in production and processing systems. Many countries have enacted legislative and regulatory measures and established sanitary and phytosanitary standards. It is envisaged that through the promotion and implementation of best practices throughout the cocoa value chain (farm to export), the yield and export of high quality cocoa compliant with international regulations and legislation on pesticide residues and other harmful substances will improve, and access to high value markets can be sustained.

The key goals of the projects are to:

i. Increase the quality standard of cocoa through empowering the capacity of SPS (Sanitary and Phytosanitary Standard).
ii. Promote and facilitate the knowledge exchange among cocoa stakeholders involved in the project, and
iii. Increase awareness on safety and regulatory issues of other cocoa stakeholders beyond the target groups of the project.

The target stakeholders are farmers, traders, processor and exporter and the institution(s) with a mandate to conduct research and carry out responsibilities for SPS.

The project adopted a collaborative regional approach to increasing the skills of cocoa stakeholders (i.e. farmers, extension services and traders) in Indonesia and Malaysia on improving the cocoa quality and cocoa safe standard. Trainings took place in a stepwise manner, starting with the training of a core group of master facilitators, who would then carry out trainings for farmer leaders, traders and processors as facilitators to build the next layer of resource persons who can engage and empower other farmers and stakeholders. The training syllabus covers a range of topics e.g. integrated pest and disease management (IPDM), standards, best practices on cocoa cultivation and post-harvest handling. However, some TOFs had to be cut short, focusing only on key topics, due to budget limitation. The budget for training was reduced significantly as many participants had to travel from remote locations to the training venues, thereby incurring higher travel costs.

4. PROJECT IMPLEMENTATION AND MANAGEMENT

The Indonesian Coffee and Cocoa Research Institute (ICCRI) is the lead national agency representing the cocoa producing country and industry country of Indonesia, and the Malaysian Cocoa Board (MCB) representing Malaysia. The advisory body for the project is the International Cocoa Organization (ICCO) while CABI took on the role of the Project Implementing Agency (PIA), responsible for project management and coordination. Project implementation at the field level was carried out in collaboration with local extension agencies, private sector (e.g. Mars Inc., Crop life) and farmer groups. The National Steering Committee (NSC) formed by the staff of ICCRI oversees project implementation.

Details of the NSC as follow:

Chairman : Dr. Teguh Wahyudi
Vice chairman : Dr. Misnawi
Secretary : Dr. Agung Wahyu Susilo
Treasurer : Ir. Sugiar
Members : 1. Dr. Soetanto Abdoellah
2. Dr. A. Adi Prawoto
3. Ir. Soekadar Wiryadiputra, SU
4. Ir. Endang Sulistyowati, MP.
5. Ir. Purmiati Astuti Ningsih

About ICCRI

ICCRI was founded in 1911, and was known as Besoekisch Proefstation then. It has the mandate from the Ministry of Agriculture of the Republic of Indonesia to conduct research and development activities in coffee and cocoa according to the Decree No. 786/Kpts/org/9/1981. The Ministry of Research and Technology of the Republic of Indonesia awarded ICCRI as the Center of Excellences for cocoa in 2012 and for coffee in 2013, in recognition of the work in developing cocoa and coffee industries in Indonesia. ICCRI's headquarter is located in Jl. PB. Sudirman No. 90 Jember East Java.

ICCRI is an independent research institution. Its operational funding is supported by the commercialization of innovative products such as high yielding planting material, biological agent for controlling pest and diseases, machinery for upstream and downstream industry (accredited HACCP), training (ICCRI-TC) and analysis services. ICCRI is accredited by KAN, i.e. ICCRI Testing Laboratory (No. LP-592-IDN) and Product Certification Agencies (LS-Pro) CCQC (LSPr-36-IDN). It is also a publisher of the open access journal (OJS) "Pelita Perkebunan" ISSN 0215-0212, ISSN 0215- 0212, E-ISSN 2406-9574 http://www.ccrjournal.com/.

ICCRI is the partner and reference for the Government and private sectors on cocoa and coffee development in Indonesia. ICCRI has worked on various collaborative research and development projects with national and international partner institutions such as Nestle R&D Centre, World Cocoa Foundation (WCF), World Coffee Research (WCR), ACIAR, USDA, Mars Inc., etc. The activities include
(1) technology transfer of coffee and cocoa mass propagation methods i.e. somatic embryogenesis,
(2) development of somatic embryogenesis coffee and cocoa seedlings,
(3) molecular biology research,
(4) multilocation trials / dissemination of superior coffee and cocoa superior planting materials,
(5) participatory selection and assessment of clones/local varieties with local governments, and
(6) development of geographical indications and improvement of the regional value of products.

ICCRI's mission are to: (1) develop science and technology concerning cocoa and coffee commodities that supporting advancement of the industry, (2) conduct transfer technology through Mediation Partnership Model (MOTRAMED), (3) develop the center information on coffee and cocoa technology, and (4) increase human resources capacity and capability on coffee and cocoa agribusiness and agroindustry sector.

5. PROJECT OBJECTIVE, OUTPUTS & ACTIVITIES

5.1. Project Objective

The general objective of this project was to produce and trade cocoa that meets food safety and international SPS standards. The targeted outputs are: (1) improved capacity of SPS and GAP knowledge among project stakeholders, and (2) effective knowledge sharing and flows between key organizations, project stakeholders, regional and international SPS authorities, and beyond, in Indonesia, Malaysia and Papua New Guinea.

5.2. Project Outputs

Component I: Enhanced Capacity of Cocoa Stakeholders in Indonesia to Improve the Quality and Safety of Cocoa

5.1. Development of locally-adapted curricula and training materials for training of master facilitators and facilitators

The CocoaSafe training syllabus was adapted from the CABI training manual to fit local farm management practices, application of GAP and SPS, and translated into Bahasa Indonesia. Topics on recommended cocoa planting materials in Indonesia, shade management, diversification system, soil fertility and health, pest/disease management, cocoa safety and quality standard of cocoa bean, and ICCRI's standards and recommended best practices were also included in the manual. The manual for the Training of Master Facilitators (TOMF) (ISBN: 978-979-8745-23-2) is entitled, "Panduan Pelatihan: Pelatihan Fasilitator Utama" (refer to Fig. 1). The TOMF manual was also used as a reference for the Training of Facilitators (TOF) and key topics have been picked out from the manual to be printed as TOF information posters.

The translators were:
1. Dr. Soetanto Abdoellah (soil management)
2. Dr. A. Adi Prawoto (agronomy)
3. Dr. John Bako Baon (soil fertility)
4. Ir. Soekadar WP, SU. (pest management)
5. Dr. Agung Wahyu Susilo (cocoa breeder)
6. Ir. Endang Sulistyowati, MP. (pest management)
7. Indah Anita Sari, SP. (cocoa breeding)
8. Febrilia Nur'aini, SP. (phytopatology)
9. Dwi Suci Rahayu, SP, MP. (enthomology)
10. Noor Arifandi, STP, MSc. (post harvest)
11. Lya Aklimawati, SP. (social economy)
12. Ir. Yusianto (post harvest)

Figure 1. The translated training syllabus as the guidance for TOMF and TOF in Indonesia

550 copies of the training manual was printed and distributed to the participants of TOMF, TOF and the local extension staff. Copies were also given out to ICCRI's researchers and technicians as guidance on the CocoaSafe project when they are in the field providing assistance to farmers. The CocoaSafe training syllabus is the first training curricula on cocoa safety in Indonesia, and could be used as the benchmark curricullum on SPS issues.

5.2. Training of master facilitators (TOMF)

5.2.1. TOMF implementation

Training of master facilitators (TOMF) was conducted at ICCRI on 15-26 September 2014. The 20 participants were selected, and were representative of the local extension services, cocoa nursery staff, outstanding farmers and junior scientists of ICCRI. The participants were selected by the NSC taking into consideration the recommendations by ICCRI's collaborators (Extension Service for estate crop or farmer's group). The participants were from the various cocoa production areas in Indonesia - West Sumatra (1 person), Lampung (1 person), West Kalimantan (1 person), East Kalimantan (1 person), North Kalimantan (1 person), South Sulawesi (2 persons), West Sulawesi (2 persons), Central Sulawesi (2 persons), Southeast Sulawesi (2 persons), Bali (1 person), East Java (1 person) - and ICCRI (5 junior scientists). The master facilitators subsequently implemented a series of training of facilitators (TOF) for local extension and farm/cooperative leader, agro-dealers, trader/processor in selected regions of cocoa growing areas / developing cocoa growing area.

Table 1. Participants' feedback on cocoa sustainability

Subject	Question	Feedback
A. Cocoa Sustainability	Why do farmers still prefer to cultivate cocoa?	• Good price and easy on shelling. • High yielding clones and technology for clonal propagation available. • Government and private sector offer support for farmer training, facilitate good and new technology, and provide linkages with stakeholders

	How large must the cocoa farm be to support minimum level of household income ?	• Good GAP – 0.4 ha (productivity 2 ton/ha) • Standard GAP 0.8 ha (productivity 1 ton/ha) • No GAP 2.0 ha (productivity 0.5 ton/ha)
	How much is the contribution of cocoa to household income ?	• Varies between 20-80% depending on location (highest in Sulawesi and lowest in Kalimantan), competes with other crops e.g. oil palm (West Sulawesi, South Sulawesi, East Kalimantan), rubber (Kalimantan, Lampung), and food crop (Lampung, South Sulawesi)
B. Cocoa Safety	How to produce cocoa without, or with minimum contaminant of (1) pesticide residue, (2) heavy metals, (3) OTA, (4) PAH, and (5) oils ?	• Train farmers on how to use pesticides rationally and on post harvest handling practices. • Observe Cadmium levels in volcanic soils • Implement IPDM to reduce pesticide use. • Implement organic farming. • Increase farmers' awareness on pesticide use.

The training was conducted in three ways: classroom theory, practical field/laboratory work and group discussions. Participants would go through the classroom theory first before they start on the practical field or laboratory exercises. Participants would then get into group discussion to review and present their feedback / recommendations on cocoa sustainability, cocoa safety and cocoa business.

Figure 2. The participants of TOMF and National Steering Committee (SC) attending project meeting at ICCRI, Indonesia

Figure 3. The session of classroom theory and group dynamic during TOMF at ICCRI

Figure 4. Practical activities in the field and laboratory during TOMF

5.2.2. Basic characteristics of TOMF participants

Participants of TOMF varied in age, education and professional background (Table 2). The participants were selected mainly based on their professions / role in the cocoa sector such as extension services, prominent farmer leader, cocoa nursery personnel, and junior cocoa researcher.

The summary of TOMF participants characteristics below:

- Ages ranged from 26 to 51 years old, most in the 40s.
- 20% of the participants were females.
- Education ranged from elementary school to degree (Masters). All had similar skills in cocoa, particularly cocoa cultivation (as this was the selection criteria).
- The participants were from various regions of cocoa growing areas - Sumatra, Kalimantan, Java, Sulawesi and Bali.

Table 2. The list of TOMF participants

No	Full Name	Age (yr)	Address	Gender	Education background	Occupation
1	H. Azis Dahlan, S. Hut, M.Si	44	Perumnas BAP B/15 Watan Soppeng Sulsel	M	Master	Local extention
2	Rahmaniar	38	Takalalla Kab. Soppeng Sulsel	F	Undergraduate	Head of farmer's group
3	Saharan, SP	51	Lingkungan 1 Petoosang Kel. Petoosang Kec. Alu Kab. Polman Sulbar	M	Undergraduate for sosio-economic of agric.	Local extention
4	Muhiddin	45	Polman Sulbar	M	Senior school for economic	Farmer
5	I Wayan Susila, SP	46	Desa Kasimbar Barat, Kec. Kasimbar Kab. Parigi Moutong Sulteng	M	Undergraduate for agric.	Farmer
6	I Gusti Ketut Sukasana	43	Desa Tovalo Kec. Kasimbar Kab. Parigi Moutong Sulteng	M	Senior school	Enterpreneur
7	Sudirman	28	Desa Kembar Maminasa, kec. Kec. Maginti, Kab. Muna Sultra	M	Senior school	Head of farmer's group
8	Sultan Nugraha Djamal, SP	41	Kel. Unaaha, Kec. Unaaha, Kab. Konawe Sultra	M	Undergraduated for agric.	Supervisor PT. SRF
9	Edi Syafianto	44	Belubus, Sungai talang, Kec. Guguk, Kab. 50 kota Sumbar	M	Undergraduate for economic studies	Farmer
10	Mustakim	47	PlosorejoRT 02/07 Kademangan Blitar	M	SLTA	Enterpreneur
11	I Ketut Windia	50	Banjar Moding Desa candi Kusuma Kec. Melaya Kab. Jembarana Bali	M	SMA	Farmer
12	Risman	36	Desa Buong Baru, Kec. Betayau, Kab. Tana Tidung	M	SD	Farmer
13	Waimin, A.Md	51	Jl. M. Iswahyudi Gg Garuda RT 03 Rinding Teluk Bayur Berau	M	D3	Local extention
14	Jembar Khaerudin	51	Balai Karangan, Kec. Sekayam Kab. Sanggau Kalbar	M	Diploma 1	Local extention
15	Riswanto	34	RT 02/04 Desa Banjar Agung Kec. Sekampung Udik Lampung Timur	M	SMK	Farmer
16	Fitria Yuliasmara, SP	30	Perum Pondok Bambu Blok U7 Jember	M	S1	Junior researcher of ICCRI
17	Indah Anita Sari	31	Puslitkoka	F	S1	Junior researcher of ICCRI
18	Lya Aklimawati, SP	26	Jl. PB. Sudirman 90 Jember	F	S1	Junior researcher of ICCRI
19	Febrilia Nur'aini, SP	30	Perum Indah Pemali Blok F7 Jember	F	S1	Junior researcher of ICCRI
20	Rudi Hartoyo	34	Dusun Timur Gunung wonojati RT03/02 Jenggawah Jember	M	D3	Technicion of ICCRI

Training efficacy was evaluated through pre- and post-testing of knowledge. The scores for pre-test:

- Pre-test scores:
    - Range: 32.5 to 90%
    - Average: 60.75%
- Post-test scores:
    - Range: 40 to 97.5 %
    - Average: 69%

(Refer to Fig. 5 for more details).

The variability of the scores indicated that:
i) There were gaps in the participants' knowledge on cocoa safety issues.
ii) Knowledge increased after training (average score in post-test was 69% in comparison to the average pre-test score of 60.75%).
iii) A few participants had good grasp on the theory. The highest scores on the pre-test and post-test were close to 100%.

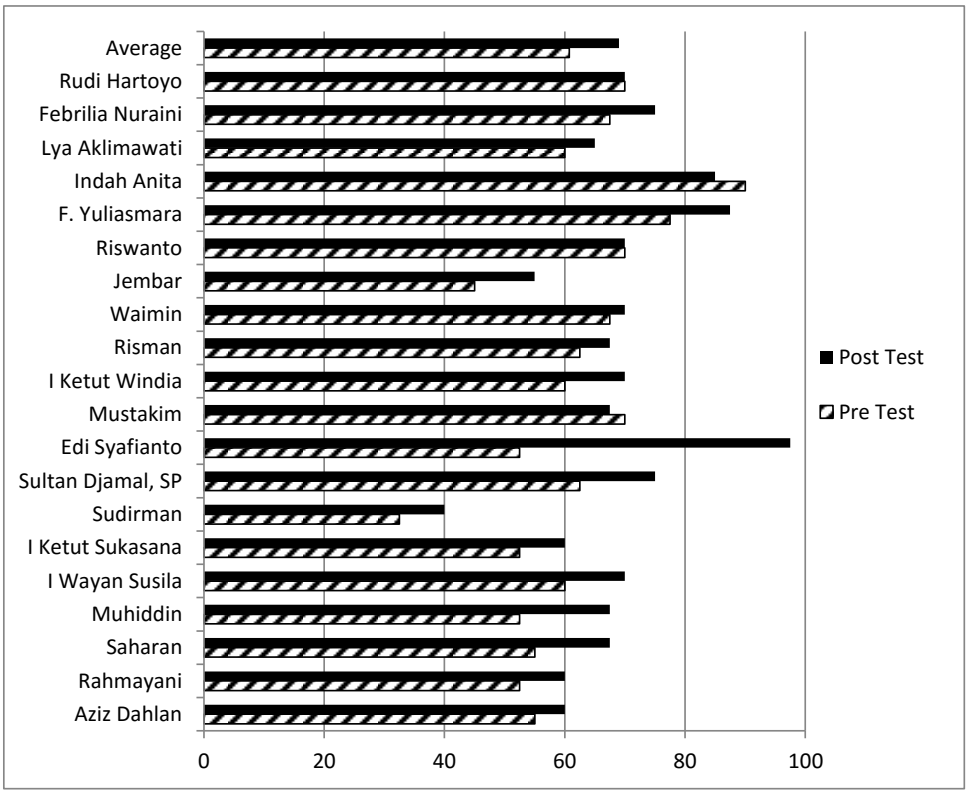

Figure 5. The score of pre test and post test of the TOMF participants

5.3. Training of facilitators (TOF) for farm leader and local extension

A series of TOFs were conducted in the cocoa growing areas in Indonesia. The selected locations were divided in two broad categories: i) Sulawesi – to represent intensive cocoa farming areas where farmers use higher rates of pesticide applications, and ii) Sumatra, Bali and Java regions – developing cocoa farming areas, where cocoa production is less intensive and there are lower rates of pesticide applications.

TOF for farm/cooperative leaders and local extension were conducted in parallel. The training locations were Soppeng District of South Sulawesi, Konawe District of Southeast Sulawesi, Polewali Mandar District of West Sulawesi, Lima Puluh Kota District of West Sumatra and Blitar District of East Java (Table 3.).

Table 3. The series of training of facilitator (TOF) had been implemented in Indonesia

Activity	Location	Date	Output the numbers of trained-participants
1. TOF for farm/cooperative leader and local extension			
	South Sulawesi	4-12 January 2015	40
	SE Sulawesi	14-22 December 2014	40
	West Sulawesi	6-15 January 2015	44
	West Sumatra	15-22 December 2014	40
	East Java	4-12 January 2015	40
2. TOF for agro-dealer			
	West Sulawesi	13-18 April 2015	60
	West Sumatra	20-27 April 2015	60
3. TOF for trader/processor and best practices in post harvest			
	Central Sulawesi	2-7 June 2015	60
	South Sulawesi	8-13 June 2015	60
	Lampung	8-14 June 2015	60

Participants comprised of farmer leaders and local extension officers. The extension officers were selected based on the recommendation of the local extension agencies for estate crops (Dinas Perkebunan). The general criteria for the selection of participants was that they must have basic knowledge on cocoa farming so that they have better understanding / response to course materials and are able to assist farmers after the training.

The training syllabus focused on the implementation of GAP e.g. proper pesticide use and safety, fertilizer application and farm management. The training elicited enthusiastic response from the participants, as they already had prior knowledge on the subject matter. The participants reported that the pest and disease are the major threat on cocoa farms due to the lack / or minimal GAP implementation. Some of the participants attended trainings on GAP but were never trained on SPS. The TOFs provided knowledge on SPS and its implementation in relation to pesticide use and safety to humans.

The TOFs were successfully implemented with the support of local goverment c.q. Dinas Pekebunan, farmer groups and the trained MF. The NSC acknowledges their support in improving cocoa production and sustainability.

Figure 6. TOF for farm leader/local extension in Soppeng of South Sulawesi

Figure 7. TOF for farm leader/local extention in Konawe of Southeast Sulawesi

Figure 8. TOF for farm leader/local extension in West Sulawesi

Figure 9. TOF for farm leader/local extension in West Sumatra

5.4. Training of facilitators (TOF) for agro-dealers

TOFs for agro-dealers were conducted in West Sulawesi (13-18 April 2015) and West Sumatra (20-27 April 2015). Both the locations were selected to represent the area with more intensive pesticide use (West Sulawesi) and the area with less intensive pesticide use (West Sumatra).

In one of the more innovative approaches of the project, TOFs were organized for for agro-dealers as they are one of the key intervention points and may not have had any formal trainings relating to pesticide use or SPS issues specific to cocoa. Agro-dealers in Indonesia is a small kiosk which shelling the agricultural production system such as pesticide, fertilizer and seed. There is a limit standard system concerning shelling procedure and regulation.

The number of participants at each training was 60 pax (3x more than targeted). The high number of participation was due to the readjustment of the training duration, namely one-day training in each location to cater to the busy schedules of the retailers.

Figure 10. TOF for agro-dealers in West Sumatra

5.5. Training on best post-harvest practices for traders and processors

Trainings for trader/processors on post-harvest best practices were conducted in South Sulawesi (8-13 June 2015), Central Sulawesi (2-7 June 2015) and Lampung (8-14 June 2015). Lampung is a fast cocoa growing area in Sumatra that would need an anticipative approach to implement best practices on post-harvest handling and processing in accordance to SPS standards. In the meantime, the Sulawesi region is the main cocoa growing area, in need of support to produce high quality cocoa confirming to the criteria of the Indonesian National Standard (SNI).

Figure 11. TOF for traders/processor in Lampung

Traders and processors play significant roles in the handling and storage of cocoa beans after harvest and drying processes undertaken by farmers. They have to be aware of standards (e.g. SPS, SNI) on tradable quality and food safety. Therefore, the trainings focused on the proper handling and storage of cocoa according to both SNI and SPS standards.

5.6. Baseline survey

Data was gathered through a survey using structured questionnaires designed by CABI. Responses were keyed into and analysed using Excel. Descriptive analysis was used to describe the characteristics of the participants. The responses are presented in 3 parts according to the nature of respondents: farmer leaders, agro-dealers and processors.

A) Farmer Leaders
N = 20 respondents x 5 locations = 100 respondents
(East Java, West Sumatera, West Sulawesi, South Sulawesi and Southeast Sulawesi)

I. Baseline Survey

Detailed below are the information from the baseline survey on the profile of the respondents - gender, age, education level, land ownership of cocoa farm, cocoa trees' age and cocoa productivity.

a) Respondent Profile

i. Gender participation: All farmers, both male and female, had equal opportunity to access knowledge and participate in the various trainings (e.g. TOF). Female involvement in the extension services and training is important, as women labor play significant role in the cocoa production system. Activities such

as harvesting and post-harvest handling, including cracking pods, fermenting harvested bean and drying involve women. These activities should be conducted in line with the Indonesian Standard on cocoa bean (SNI) to improve cocoa quality. Thus, women participation in the TOF would have impact on the implementation of SPS in the cocoa production system.

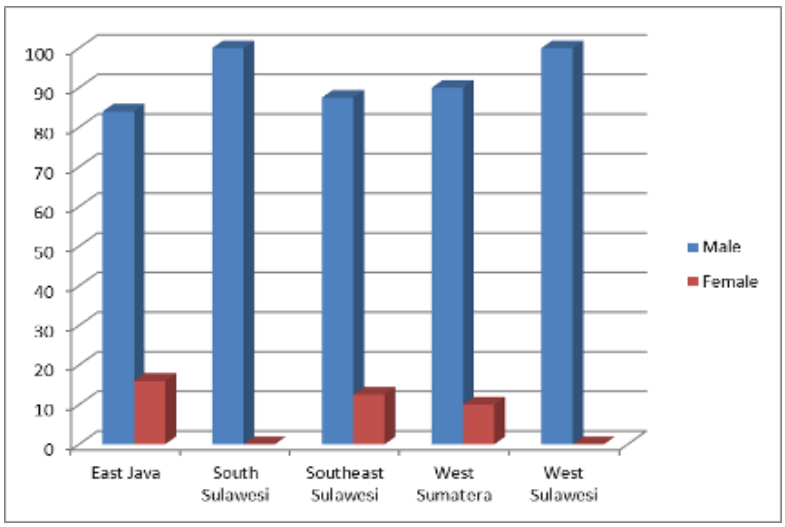

Figure 12. Gender proportion of TOF participants for farmer's leader in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi

Figure 12 shows that an average of 10% of the participants of the TOF trainings in East Java, Southeast Sulawesi and West Sumatra were women. The TOF trainings in South Sulawesi and West Sulawesi had no women participation.

ii. Age: Farmers' age plays an influence on the adoption of new technology. The Badan Pusat Statistik Indonesia (2012), listed three classifications of age: 0-14 year-old classified as unproductive age, 15-64 year-old classified as productive age, >65 year-old classified as non-productive age. Farmers in productive age tend to adopt new innovation easily and faster. Farmers in non-productive age group were more resistant in adopting new innovations.

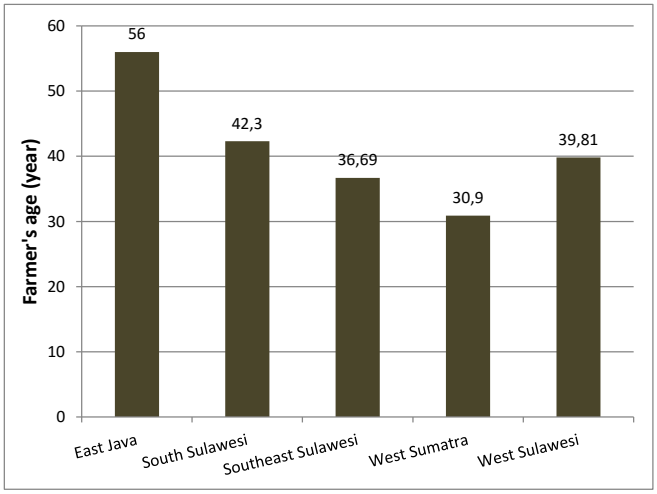

Figure 13. Average of farmer's age of TOF participants for farmer's leader in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi

Figure 13 shows that the cocoa farmers in the cocoa growing areas were within the productive age range (minimum average age: 31; maximum average age: 56). Cocoa farmers in East Java were older compared to the other four areas. Field observation noted that cocoa trees in East Java were grown less intensive compared to South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi where farmers were younger and cocoa were grown more intensively in these areas. Soekartawi (2005) argues

that younger farmers were more motivated to improve their knowledge and skills; hence, were more likely to adopt new innovations, despite the lack of experience with the given technology / tools.

iii. Education level: Education plays an important role in improving standard of living. Saridewi (2010) argues that people who have higher education level tend to be more open to new ideas, and were more adept to evaluate and take calculated risks. Formal education, commonly obtained through schooling, is one indicator that can be used to measure people's knowledge, capabilities and skills.

In Indonesia, the proportion of residents with lower formal education in the rural areas is higher than residents with higher formal education level (Hartatri, 2015). In bigger cities, basic level of education is easily accessible due to the availability of support infrastructures for education. Conversely, in rural areas, access to schools / knowledge is limited due to poor infrastructure.

The classification of school education Indonesia is as follows:

- Elementary: standard of 6 years (6-12 years old)
- Junior high school: 3 years (12-15 years old)
- Senior high school: 3 years (15-18 years old)

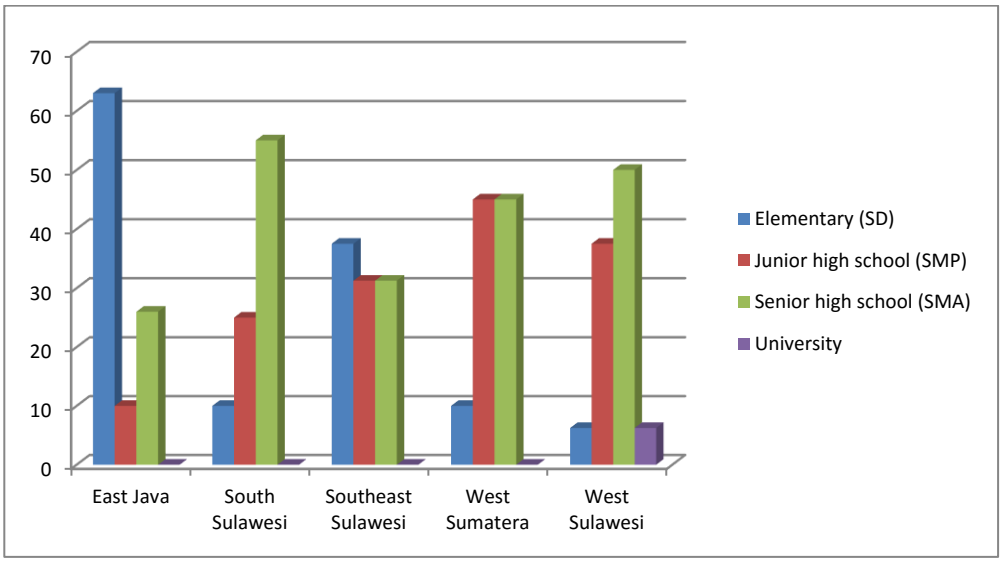

Figure 14. Education level of farmer's leader in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi

Education level of cocoa farmers in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi varied (Fig. 14). Education level of cocoa farmers in East Java was the lowest, where a majority of respondents only attained elementary school qualification as the highest level of education and none had furthered their study at universities. Conversely, the education level of cocoa farmers in West Sulawesi was the highest as there were 5% respondents who have pursued university education.

East Java had the highest proportion of older farmers. It is presumed that the low level of education attainment is due to poor public infrastructure, especially in the past, and different priorities setting where fulfilling household basic needs, especially food, should be prioritized over education.

iv. Cocoa farm ownership: Indonesian cocoa farmers are generally small-scale farmers (refer to Figure 15). Cocoa farmers in Southeast Sulawesi had the highest average number of plots (~2.4) with an average size of 2.3 ha. Farmers in West Sumatra had the least average number of plots (1) with the average size of 1.7 ha. Farmers in East Java owned a higher average number of plots (1.7) but with smaller hectarage (0.6 ha) compared to West Sumatera.

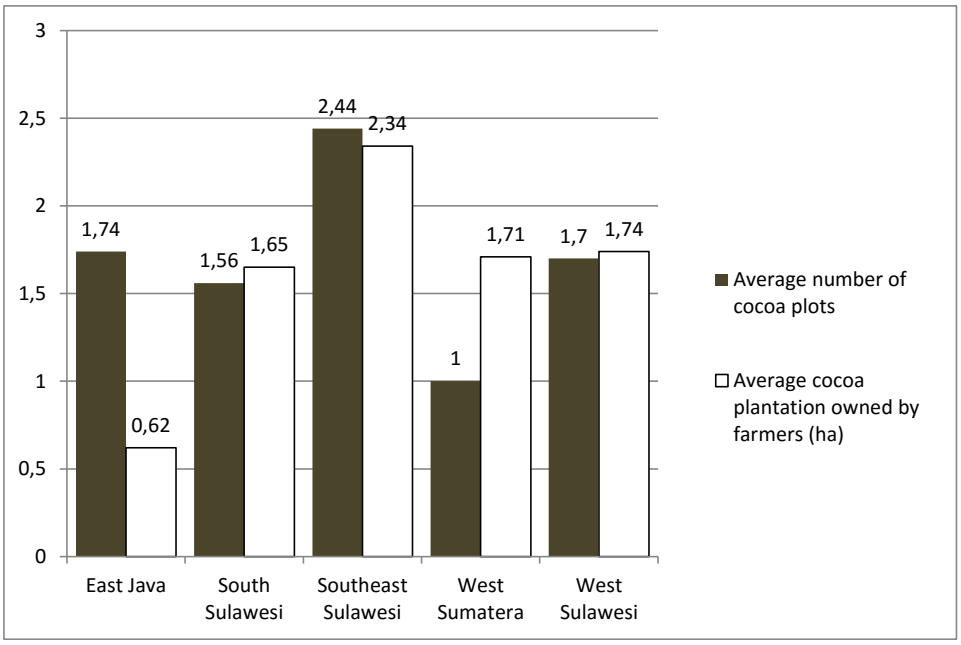

Figure 15. Cocoa farm ownership in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi

The population density of the regions influenced the size and number of plots owned by cocoa farmers. Southeast Sulawesi had the lowest population density (64 people/km^2). West Sulawesi (75 people/km^2), West Sumatera (122 people/km^2), South Sulawesi (180 people/km^2) had higher population density (in ascending order), with East Java having the highest population density (808 people/ km^2). Hernanto (1993) states the ownership of agricultural land influences the income, quality of life and household farmer's wealth. In addition, ownership of agricultural land will likely influence the adoption of new technology.

v. Household income: Table 8 shows that the highest average total income of farmers was in Southeast Sulawesi, while East Java had the lowest average total income. Income from cocoa made up a major proportion of earnings for farmers in Southeast Sulawesi, West Sumatra, West Sulawesi and South Sulawesi. Farmers in East Java supplement their income from cocoa with other cash crops, labour work and others (unspecified); land availability is a key constraint for East Java.

Table 8. Cocoa smallholder farmers' income in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi

Indicators	East Java	South Sulawesi	Southeast Sulawesi	West Sumatra	West Sulawesi
Average income from cocoa (IDR/year)	3,845,789	11,714,400	53.250.000	24,712,667	15,268,750
Average income from other commodities (IDR/year)	3,455,263	1,130,808	11.603.125	9,266,667	7,606,250
Average income from labour (IDR/year)	1,570,425	50,000	0	0	3,168,750
Average income from others (IDR/year)	666,666	50,000	0	4,000,000	656,250
Average income from cocoa trading (IDR/year)	878,947	0	0	0	0
Average total income (IDR/year)	6,647,059	9,521,163	64,853,125	33,290,000	26,700,000

b) Cocoa farm performance

i. Age and productivity of cocoa trees: The productivity of cocoa tree is influenced by its age. Most cocoa trees have an economic lifespan from 25 to 40 years. The trees start fruiting after 4 years of transplanting. The yield grows exponentially until 10 years of age, and starts declining at 20 years of age (Fule, 2013).

Table 4. The productivity of cocoa farm and cocoa tree's age in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi

Category	East Java	South Sulawesi	Southeast Sulawesi	West Sumatra	West Sulawesi
Cocoa tree age (year)	8	10.11	13.5	5.3	11.69
Cocoa productivity (kg/ha/year)	509.28	620.31	825	712.67	567.71

Table 4. show the productivity of cocoa in each targeted areas. Cocoa productivity in Southeast Sulawesi were the highest, which was 825 kg/ha, while the lowest was in East Java, which of 509.28 kg/ha. The higher cocoa productivity in Sulawesi compare to other area as the impact of GERNAS program. Farmes adopted high yielding clonal planting material and implementing GAP that cocoa productivity were so higher than others.

c) Cocoa production system

Each activity in the production system (e.g. fertilization, pruning and sanitation) affects the quality and safety of cocoa beans.

i. Fertilization: Farmers had limited access to financial facilities, restricting their ability to purchase and apply the required amount of fertilizers for cocoa trees. Therefore, the average of cocoa productivity in Indonesia is lower than that its potential. To overcome financial barriers and improve productivity, many cocoa stakeholders, including GoI, NGO and private sectors have launched various initiatives / interventions. The main intervention by the GoI is the GERNAS program (launched in 2009) focusing replanting, rehabilitation and intensification of cocoa plantations. Fertilization is a key component in increasing cocoa yield as part of the intensification activities.

Table 5. Fertilization application on cocoa farm

Fertilization application	East Java	South Sulawesi	Southeast Sulawesi	West Sumatra	West Sulawesi
Fertilizing (times/year)	2	1.85	1.62	1.7	1.8
Average volume of fertilizer (kg/ha/year)	241.9	305.12	314.28		406.5
Farmers using organic fertilizer (%)	89	50	68.75	70	68.75
Farmers not using organic fertilizer (%)	11	50	31.25	30	31.25
Average volume of organic fertilizer (kg/ha/year)	1,860.41	60.3	NA	60	443.75

Baseline survey indicated farmers in West Sulawesi used the highest dosage of inorganic fertilizers in amount of 406.5 kg/ha/year which be applied 1.8 times per year (Table 5) meanwhile farmers in East Java, was the lowest, which of 241.9 kg/ha/year. On the other hand the using organic fertilizer by cocoa farmers in East Java was the highest, which of 89% of the respondents use organic fertilizers followed by farmers in West Sumatra, Southeast Sulawesi, West Sulawesi and South Sulawesi in where, the numbers of respondents use organic fertilizers were 70%, 68.75%, 68.75% and 50% respectively. In line

with the numbers of cocoa farmers using organic fertilizers, the volume of organic fertilizers used by farmers in East Java also the highest, in amount of 1,860.41 kg/ha/year.

ii. Weeding,pruning and harvesting

Weeding and pruning also play important role in cocoa production system. A well-managed cocoa farm with regular weeding will reduce competition by weeds for fertilizers. Likewise for farms that practice regular pruning to increase light penetration through the leaf canopy and stimulate flowering on the trunk and branches. Regular pruning will also help minimize pest and disease.

In smallholder farmers, there are two types of weeding usually be applied, namely manual weeding and spraying herbicides. Nowadays, many agro-dealers who provide various chemicals including herbicides exist in cocoa producing regions. Therefore, nowadays, herbicides are easily accessed in the rural areas. This has increased the using of chemicals, including herbicides in cocoa farm. Conversely, the numbers of farmers who do manual weeding decreased steadily.

Table 6. Weeding, pruning and harvesting activities in cocoa plantation

Activity	East Java	South Sulawesi	South Sulawesi	West Sumatra	West Sulawesi
Weeding (times/year)	2	1.65	2.14	3.4	1.31
Pruning (times/year)	2.1	1.75	1.81	11.6	1.87
Interval harvest (days)	10	12.2	13.5	5.67	9.75
Average number of harvest (times/year)	36	44.3	9.12	10.5	14.5

Table 6 shows that the highest weeding activity was reported in West Sumatra (3.4 times/year), followed by Southeast Sulawesi (2.14 times/year), East Java (2 times/year), South Sulawesi (1.65 times/year) and West Sulawesi (1.31 times/year).

The pruning frequency of farmers in West Sumatra was the highest, while South Sulawesi was the lowest. As informed above cocoa productivity in West Sumatra was the highest would be related to the pruning activity of cocoa farmers, thus, the productivity may be significantly influenced by pruning system. Table 6 shows the activity on cocoa production system in which the interval of harvesting in South Sulawesi was the highest, which was 44 times per year, while in Southeast Sulawesi was the lowest.

iii. Pesticide use

The high use of pesticides increases pesticides residue level on cocoa beans. Countries, such as Japan and the EU, have recently, new regulations on food safety and pesticides residue. Hence, encouraging farmers to minimize chemical use, including pesticides on their cocoa farms is important because this will assure that the Indonesian cocoa bean will be accepted in global markets, thereby improving livelihood of farmers.

Table 7. Pesticides use in smallholder farmers' level in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi

The activity on using pesticide	East Java	South Sulawesi	Southeast Sulawesi	West Sumatra	West Sulawesi
Farmers using pesticides (%)	42	85	100	40	56.25
Farmers not using pesticides (%)	58	15	0	60	43.75
Average spraying pesticides (times/year)	1.42	15.05	14.87	4.25	15.6

Table 7 shows that the pesticides use in Southeast Sulawesi was the highest (100%), with an average spray rate of 14.87 times per year. Meanwhile, the pesticides use in West Sumatra (40%, 4.25 sprays/year) and East Java (42%, 1.42 sprays/year) were the lowest. This indicated that the pesticides

residue of cocoa produced by smallholder farmers in Southeast Sulawesi may be higher compared to other cocoa producing area. The pesticides use in Sulawesi is comparably higher than Sumatra and Java. This is most likely because there are many agencies – governmental and NGO – and the private sector providing extensive extension services for farmers in Sulawesi, the central cocoa producing region, influencing higher rate of pesticide use.

iv. Farm Sanitation

Farm sanitation plays a significant role in controlling pests and diseases, especially through the removal of infected pods by CPB or PPR, and ultimately increasing cocoa productivity.

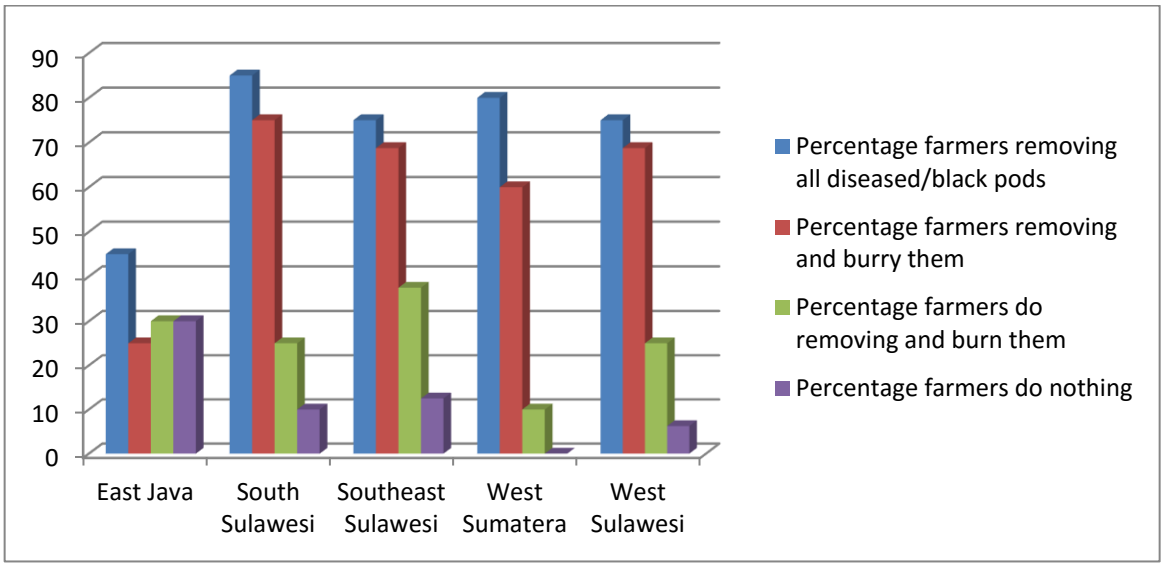

Figure 16. Sanitation in cocoa plantation in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi

In Figure 16, East Java has the highest percentage of farmers who do not remove diseased pods (~30%). In contrast, not one respondent from West Sumatera left diseased pods in the field; they removed all diseased pods be it by burning or burying. Majority of the farmers in South Sulawesi removed infected pods and buried them underground (~1 m deep).

v. Problems in cocoa farm

Figure 17 indicates that the problems in cocoa farms in these five regions were very varied. In general, pest and diseases problems in Southeast Sulawesi main problem to cocoa production was pest and disease. East Java key constraint is fertilizer – most agricultural lands in Java are for paddy cultivation and subsidized fertilizers are prioritized for paddy fields. Both East Java and West Sulawesi had issues with tree health.

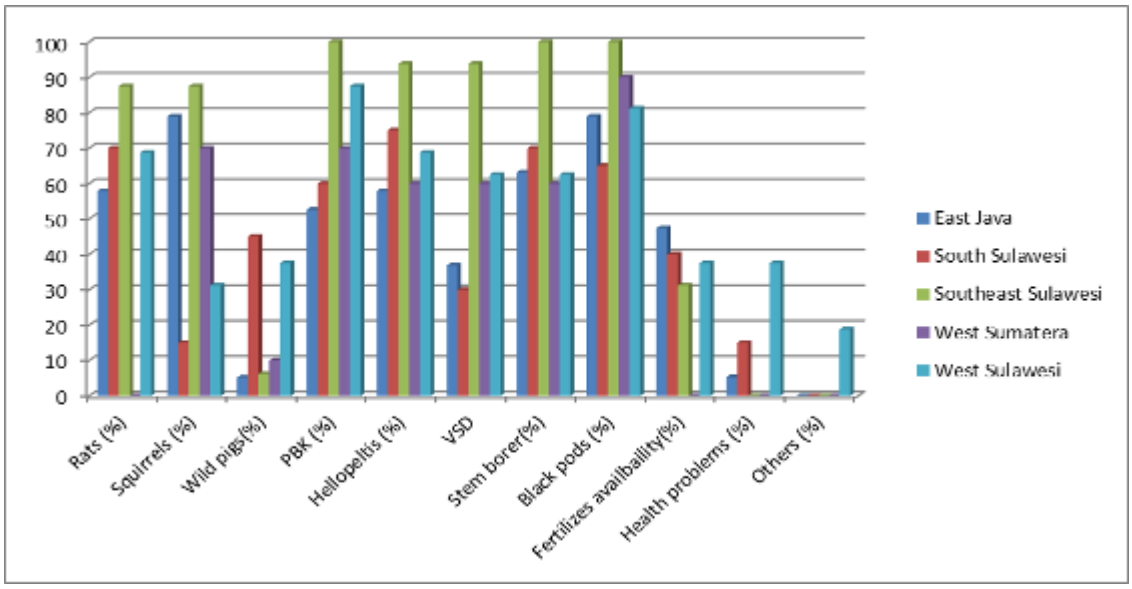

Figure 17. The proportion of pest and diseases incidence on cocoa farm

d) Post-harvest handling

i. Cocoa pods cracking

Post-harvest handling starts from pod cracking to the drying of cocoa beans. Figure 18 shows that most farmers crack cocoa pods immediately after harvest. In East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi, the percentage of farmers who cracked cocoa pods immediately was about 50%, 45%, 85%, 20%, 37% respectively. If there is enough cocoa pods gathered for fermentation, it is advisable to crack open the cocoa pods immediately to extract the beans. However, if there are not enough pods gathered, farmers can gather and store before cracking but they should not left the pods unopened more than 1 week. In addition, the figure also shows that almost none farmers store pods for more than 1 week. The responses indicate that the farmers have no issues with the timing of pod cracking.

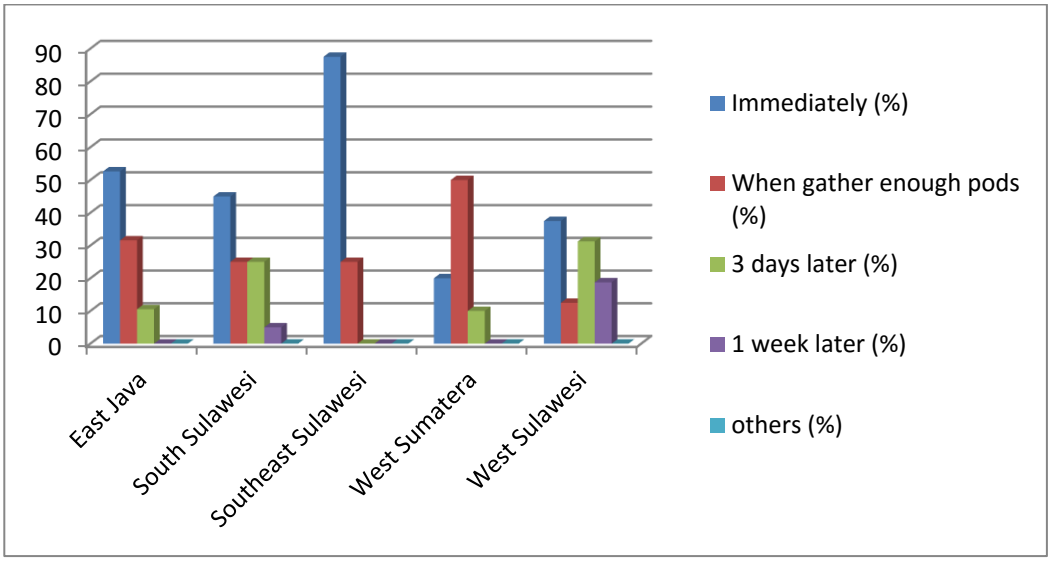

Figure 18. Cocoa pods cracking activity

ii. Cocoa fermentation: Figure 19 shows that fermentation of cocoa beans was only carried out in East Java, South Sulawesi and West Sulawesi. East Java had the highest percentage of farmers who fermented their cocoa beans, comparatively, using wood box fermentation and basket fermentation to a lesser extent. The farmers in Southeast Sulawesi fermented using the basket fermentation method. South Sulawesi farmers employed a combination of methods – heap, basket and wood box; while West Sulawesi farmers used wood box and basket fermentation methods. Farmers of West Sumatera did not

ferment their beans, most likely because knowledge on fermentation was inadequate and farmers preferred immediate cash returns by selling wet beans directly to processors. The different price of fermented cocoa and unfermented cocoa is very low, accounted for IDR 2.000 – IDR 3.000,- per kg.

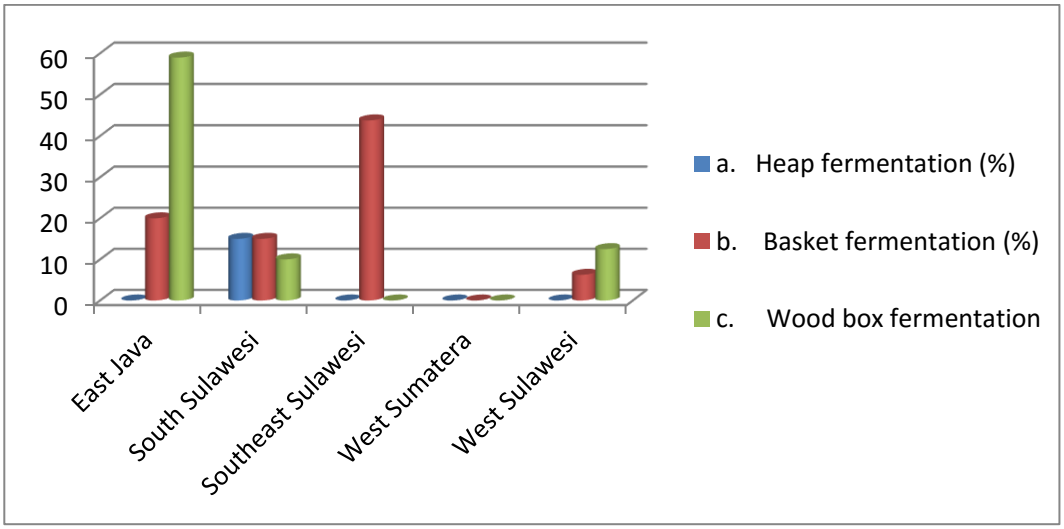

Figure 19. Variation the method on cocoa fermentation

Turning beans during fermentation also play an important role in producing high quality cocoa. Ideally, the beans should be fermented for 4 days, turning the beans 3 times (1 time each on second, third and fourth day). Only farmers from West Sulawesi turned their beans everyday, although it was generally low on the whole. East Java had the highest percentage of farmers who turned their beans 2 times, followed by South Sulawesi. Other regions turned at least once, but there were a high percentage of farmers who did not turn beans in Southeast Sulawesi. This indicates that generally, the quality of fermented cocoa produced by farmers in East Java and South Sulawesi was higher than that of cocoa produced from Southeast and West Sulawesi (see Figure 20).

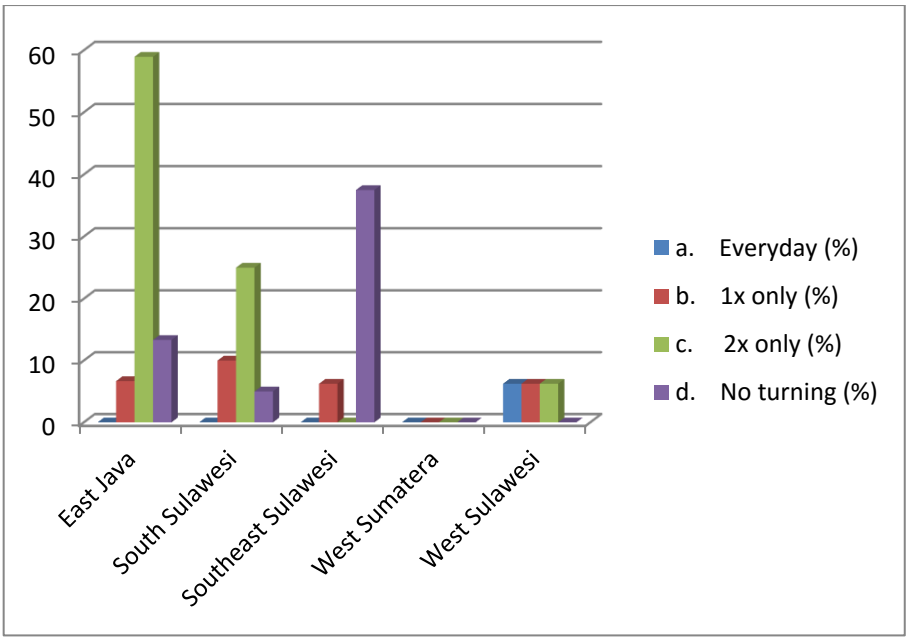

Figure 20. The turning frequency on cocoa fermentation

iii. Cocoa drying: The cocoa drying stage is a crucial stage to manage contamination of PAHs. PAHs contamination indicates improper drying process. PAHs are more likely to appear if cocoa is dried using artificial dryer, which uses firewood. The smoke produced by firewood will contaminate cocoa beans with PAH.

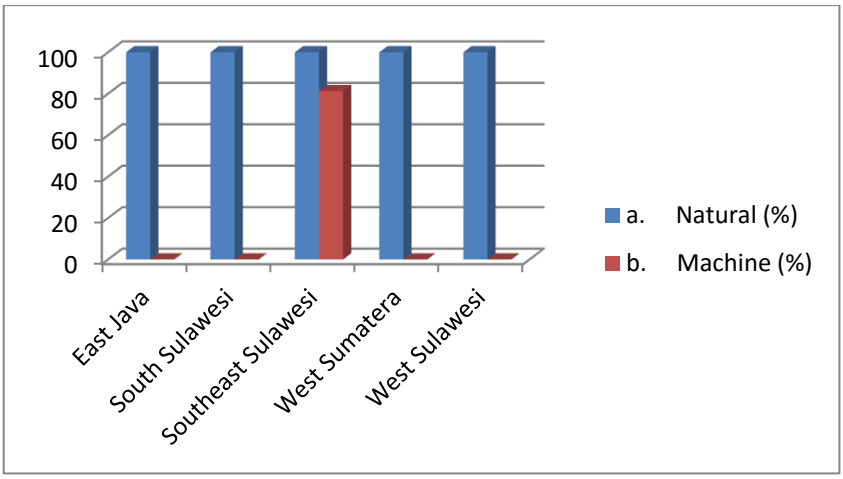

Figure 21. The method be used for cocoa drying

Figure 21 shows that the most cocoa farmers in the five cocoa producing areas used natural sun drying process. Only farmers in Southeast Sulawesi used both sun drying and machine drying processes.

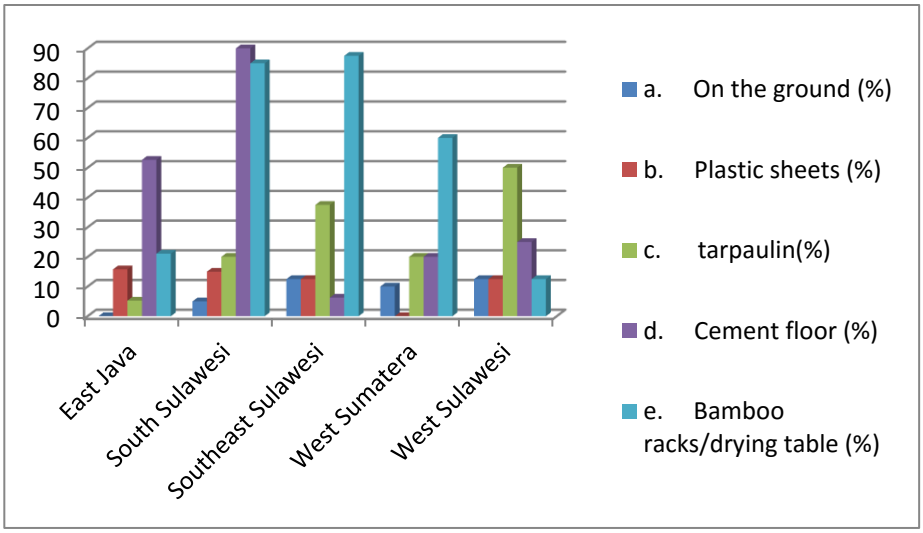

Figure 22. Several tools used for cocoa drying

Figure 22 illustrates the preferred method used by farmers for drying cocoa beans. In East Java and South Sulawesi, the majority of cocoa farmers dried their beans directly on cemented floors, 50% and 90% respectively. A majority of farmers in South Sulawesi also dried their beans on the ground. This commonly happened in the peak season of cocoa harvest, because the high volume of cocoa beans produced by farmers. In Southeast Sulawesi and West Sumatra, the majority of farmers dried their cocoa beans on the ground, accounted for 87% and 59% respectively. Farmers also used tarpaulin and plastic sheet to dry cocoa beans.

iv. Cocoa storage: Storage also plays a key role in the quality of cocoa bean - the beans have ability to absorb odour from the surroundings. Therefore, the aroma of cocoa will be preserved if the cocoa beans are stored in the warehouse properly, away from any strong smelling items. In Indonesia, cocoa is commonly planted with other cash crops e.g. coconut, durian and pepper, and the beans may be stored with these crops once harvested.

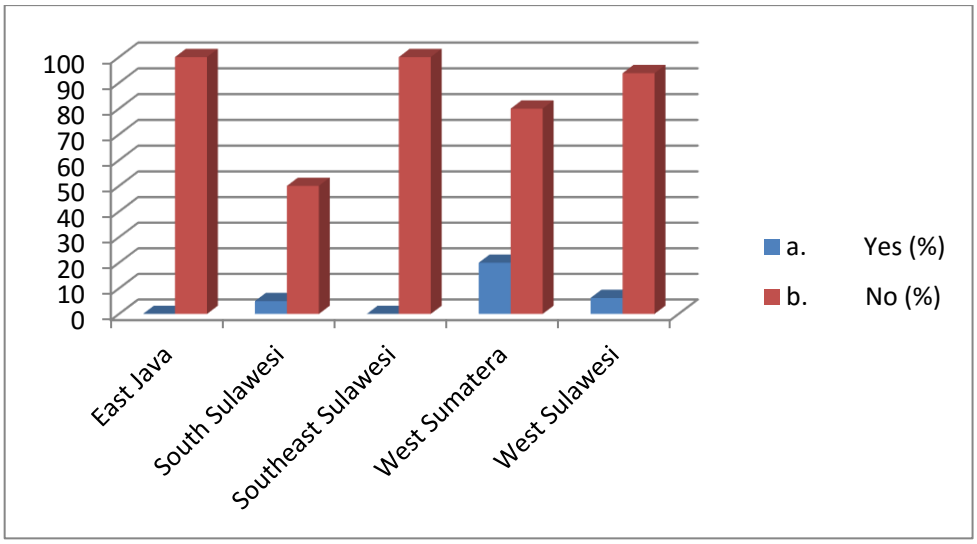

Figure 23. Cocoa storage with other products

Figure 23 illustrates that the majority of respondents in East Java, South Sulawesi, Southeast Sulawesi, West Sumatra and West Sulawesi did not store the cocoa bean together with other commodities, primarily because wet beans are sold off immediately to processors for immediate cash returns for household and schooling expenses. Similarly, more processors preferred to buy wet beans in order to control and manage the fermentation process to attain better quality beans.

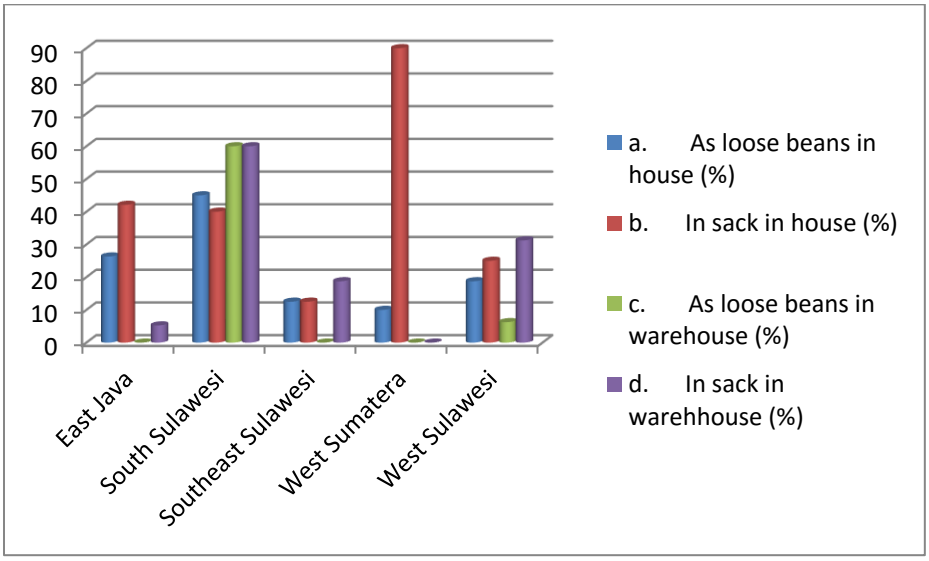

Figure 24. The storage method of cocoa bean

Figure 24 shows the variation in storage methods and the storage preference of the respondents from each region. Farmers in East Java store cocoa beans as loose beans in house (25%), in sack in house (40%) and in sack in warehouse (5%). Farmers in South Sulawesi stored their beans mainly in the warehouse either as or in sacks. Beans stored in houses are either loose or packed in sacks. In Southeast Sulawesi, farmers tend to store beans packed in sacks in warehouses, followed by in house storage (i.e. loose beans and in sacks). In West Sumatera, most farmers preferred to store beans in sacks and in the house (~90%); less than 10% stored beans in the loose form in the house. In West Sulawesi, farmers mainly stored beans in sacks in warehouse, followed by storage in houses (in sacks and loose), and as loose beans in warehouses to a lesser extent.

e) Pesticide use in cocoa farm

Many farmers still used pesticides to control pests and diseases e.g CPB, PPR and VSD, as it is effects control quicker and is less labour intensive compared to integrated management, pruning, frequent-harvest and sanitation. Considering the difficulty to get labour in agricultural sector, pesticides offer a good alternative to control pests and diseases. The pesticide used on cocoa farm will impact the quality of cocoa bean, particularly the residue of pesticides. It is therefore important to ensure that pesticide use must be in compliance with regulations to maintain the Indonesian cocoa in global markets.

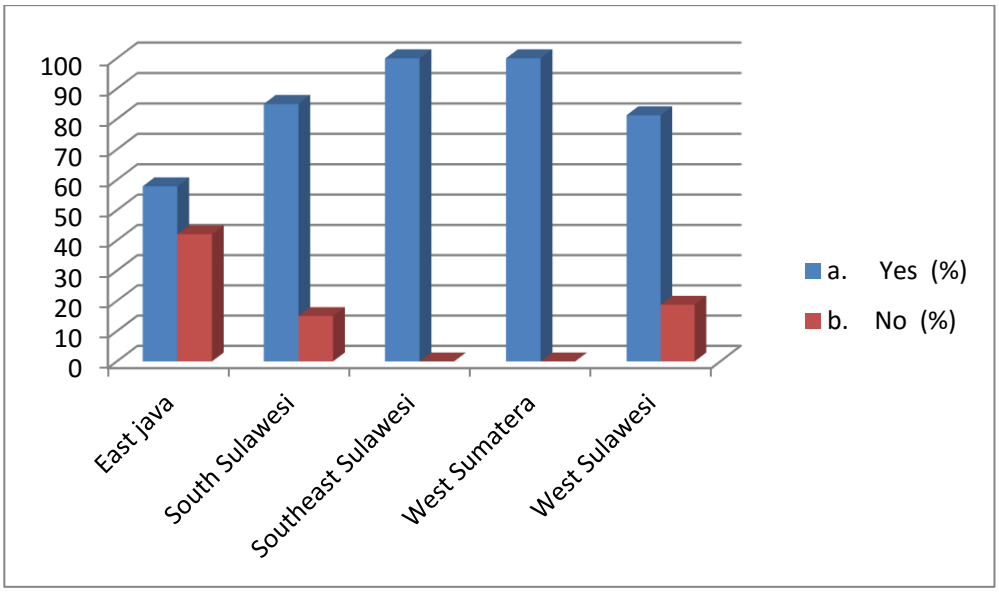

Figure 25. The comparison on using pesticides in cocoa plantation

Figure 25 shows that a majority of the farmers in all five cocoa producing regions still used pesticides. Southeast Sulawesi and West Sumatera recorded the highest number of pesticide users (98%), followed by South Sulawesi, West Sulawesi and East Java.

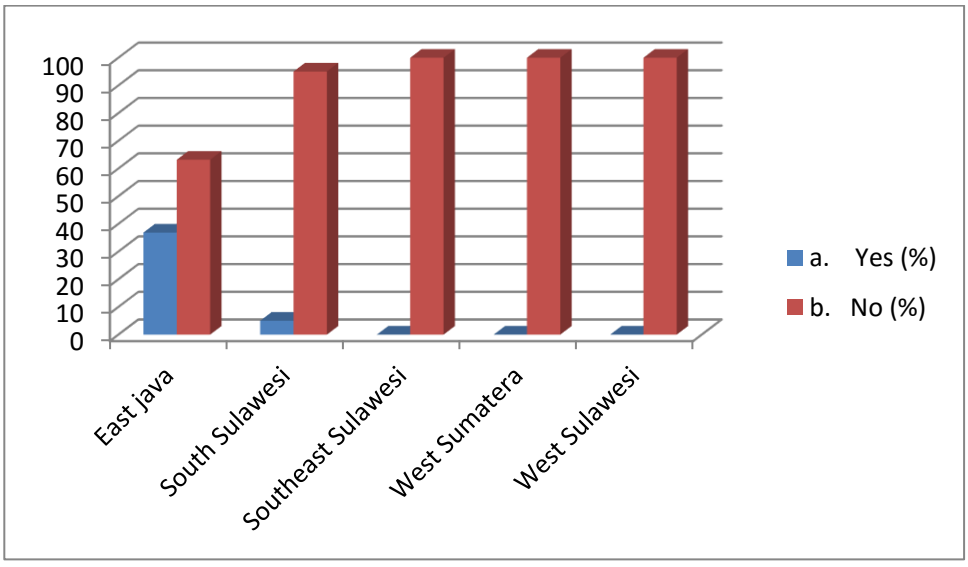

Figure 26. Non-branded pesticides used in cocoa farm

The survey also sought to elucidate how much non-branded pesticides were used. Only in East Java and South Sulawesi were there respondents who reported that they used non-branded pesticides, 30% and 5% respectively (see Figure 26).

i. Equipment use to apply chemicals: Figure 27 shows that most farmers in all five regions used hydraulic knapsack sprayer for chemical application as the knapsack sprayer is the most common tool sold in the local market.

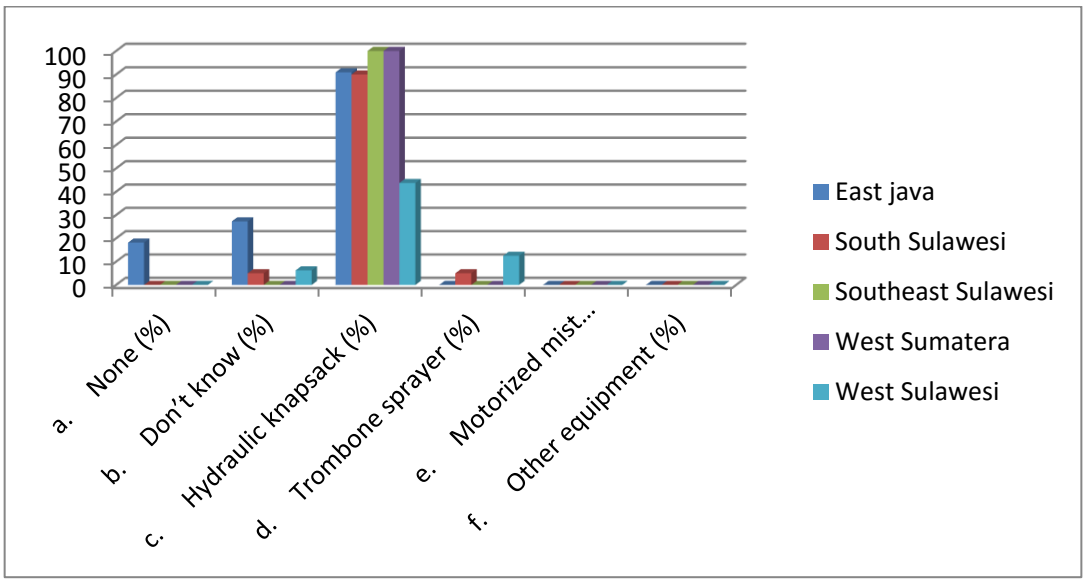

Figure 27. Equipment used for pesticide application

ii. Equipment worn for protection when applying chemicals: Figure 28 shows that on the whole, a majority of cocoa farmers in the five regions used some form of personal protection equipment e.g. hat, gloves, rubber boots, long sleeves and trousers and mask for nose and mouth, apron, coat, eye glasses and full face mask (visor) for protection when apply chemicals. Only a small number of farmers did not use any personal safety equipment.

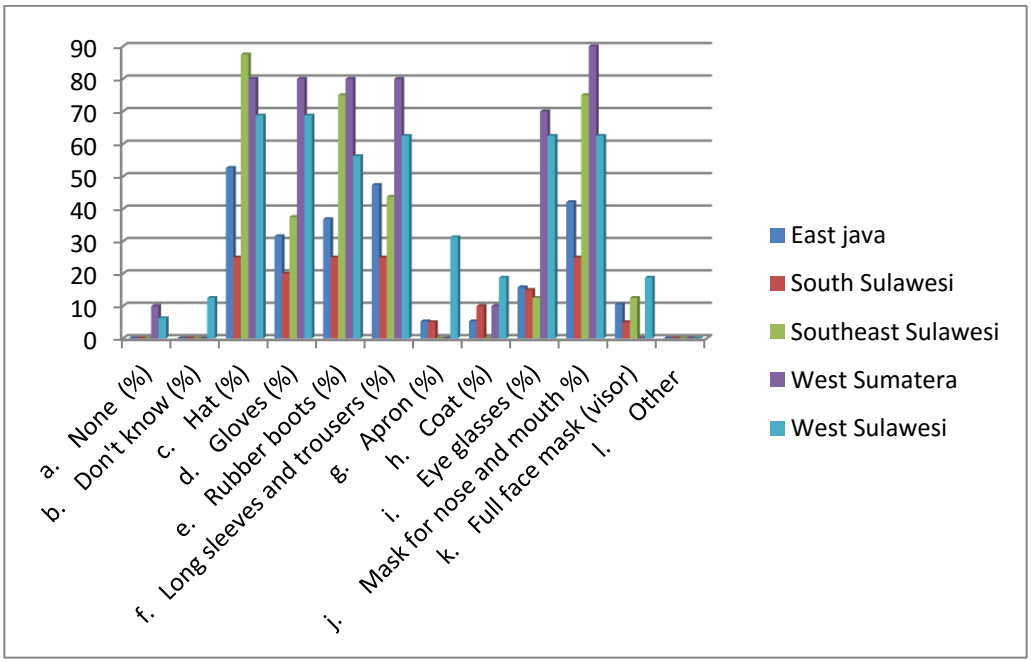

Figure 28. Equipment worn for body protection during chemicals application

B) Agro-dealers

TOFs for agro-dealer were conducted in two cocoa producing areas - West Sumatra and West Sulawesi. 20 agro-dealers participated in each TOF. The aim of the agro-dealer baseline survey was to understand the types of chemicals provided by agro-dealers in cocoa producing regions, the distribution network and sales volume.

i. **Type of organization:** About 71% of the respondents in both West Sumatra and West Sulawesi were solely retailers, while the remaining ~30% were also farmer group/cooperative (Fig. 29). This indicated that farmer group/cooperative were also actively involved in the on-farm sector, selling agro-chemicals (which could also provide jobs opportunity for farmers and the younger generation).

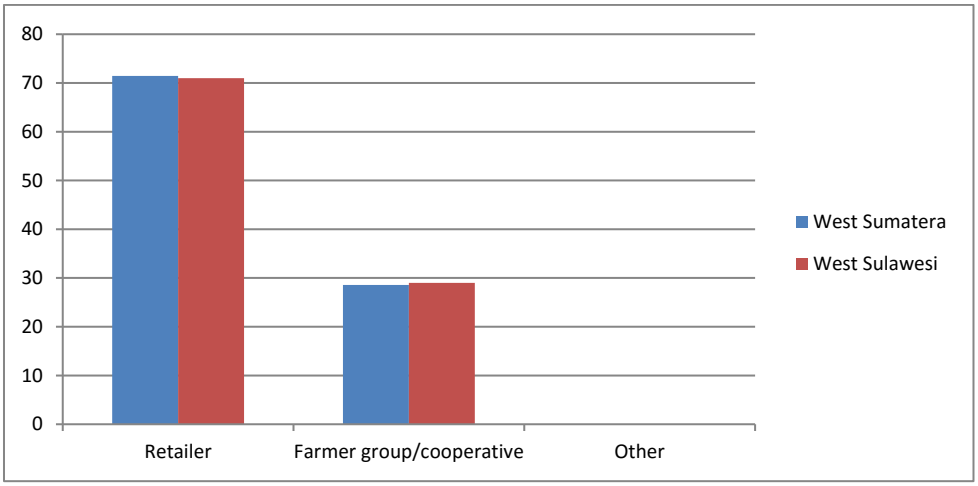

Figure 29. Organization type of agro-dealer

ii. Source of pesticides: Fig. 30 shows the direct sources of pesticides, which ranged from retailer, importer, pesticides manufacturer and others. Most pesticides are sourced directly from retailers (~50% in West Sumatera and 69% in West Sulawesi). A lesser extent of pesticides were sourced directly from pesticides manufacturers and lesser still, the importers.

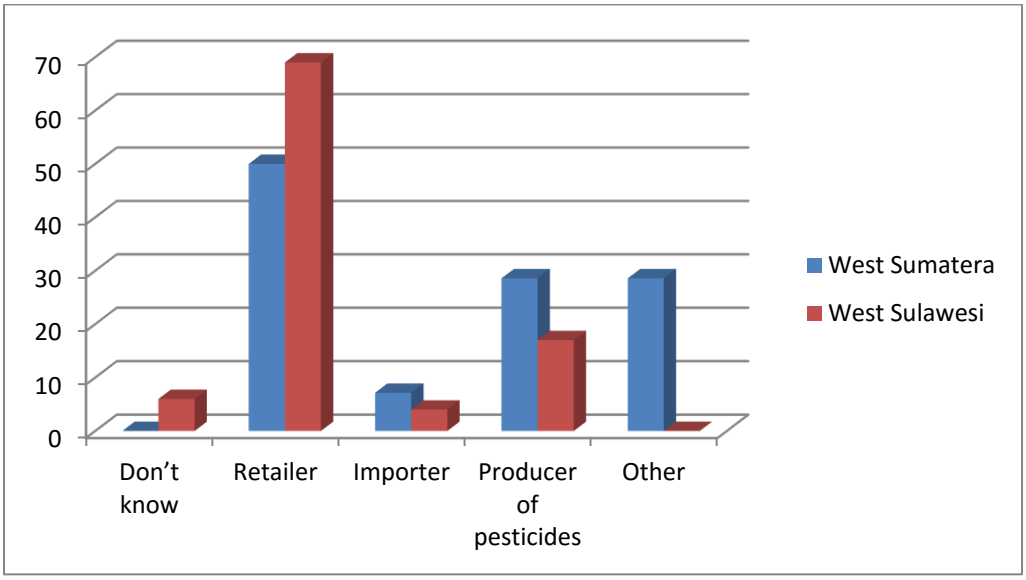

Figure 30. Source of pesticides used in cocoa farm in West Sumatra and West Sulawesi

iii. Top sales of pesticides in the last 2 years: Figure 31 shows that both West Sumatera and West Sulawesi exhibited similar trends in the types of pesticides sold. Insecticides and herbicides were the top selling products in the last 2 years, followed by fungicides. The graph also showed that the sales of pesticides in West Sulawesi were lower compared to West Sumatera.

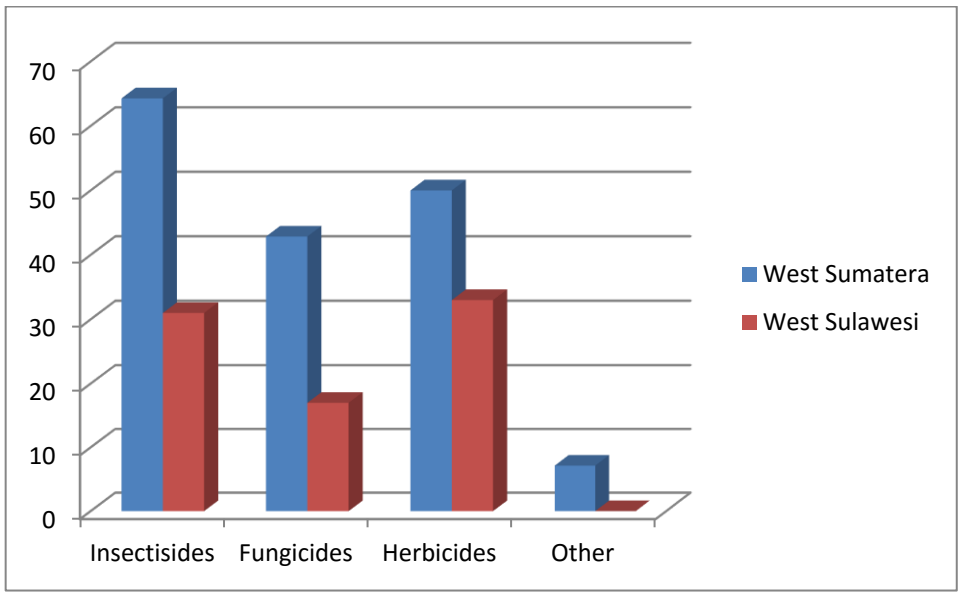

Figure 31. Top sales of pesticides in the last 2 years in West Sumatra and West Sulawesi

iv. Top sales of agro-chemicals for cocoa in last 2 years: Figure 32 shows that in both West Sumatra and West Sulawesi, most respondents informed that the top sales of agro-chemicals used in cocoa farm in the last 2 years are insecticides, (~50% and 42% respectively). In West Sumatra, this followed by the sales of herbicides, fungicides and bio pesticides. In West Sulawesi however, only fungicides are used in addition to insecticides. The difference in use and sales could indicate that farmers in West Sumatra were cultivating cocoa more commercially.

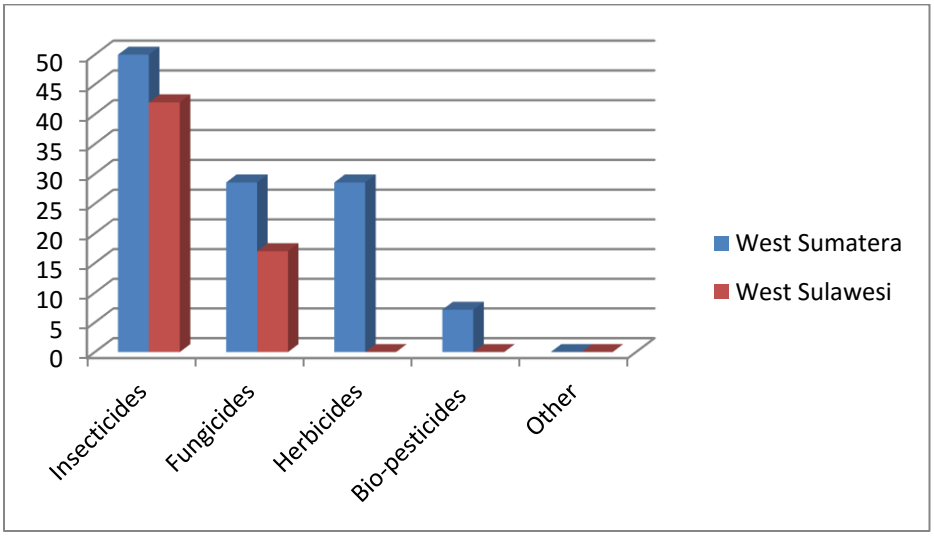

Figure 32. Top sales of agro-chemicals for cocoa in the last 2 years in West Sumatra and West Sulawesi

v. Type of agro-chemicals sales for any purpose: In order to understand the general use of agro-chemicals in cocoa producing regions, the baseline survey was conducted. Fig. 33 illustrates the use of insecticides was the highest, accounted for about 78.57%, followed by the sales of herbicides and fungicides, accounted for 71.42% and 50%. This indicates that agricultural sector was conducted by farmers intensively. The agro-chemicals sales of insecticides and herbicides in West Sulawesi was the

highest, accounted for 92%. This followed by the sales of fungicides, accounted for 86%. This also indicates that the agricultural sector was conducted intensively.

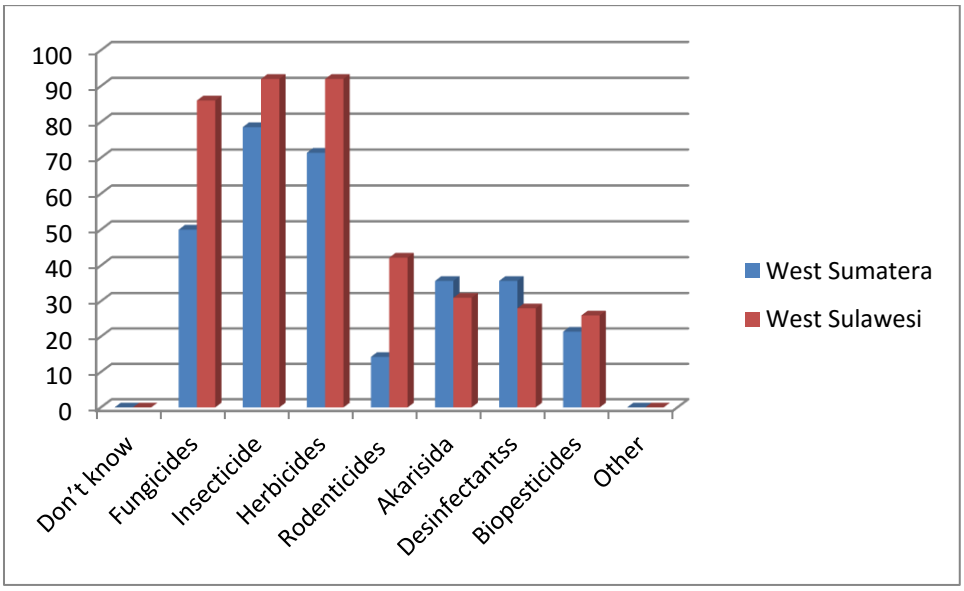

Figure 33. Type of agro-chemicals sales for any purpose in West Sumatra and West Sulawesi

vi. Type of agro-chemicals sales for cocoa: Fig. 34 indicates the type of agro-chemicals sales for cocoa in West Sumatra and West Sulawesi. In general, the sales of agro-chemicals in West Sulawesi were much higher than in West Sumatra. This may be in West Sumatra relatively new as cocoa producing area compared to West Sulawesi. Therefore, West Sulawesi has more pest and disease attack in cocoa farm. In line with the sales of agro-chemicals for any purposes, the sales of insecticides in West Sumatra was the highest, followed by herbicides and fungicides, accounted for 57.1%, 50% and 21.4%, respectively.

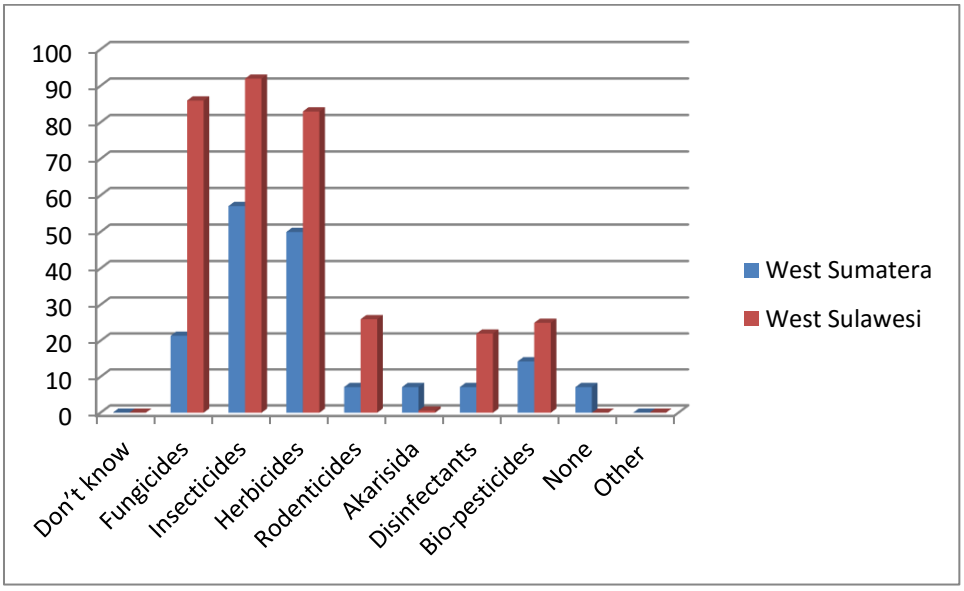

Figure 34. Type of agro-chemicals sales for cocoa in West Sumatra and West Sulawesi

Also, in line with the sales of agro-chemicals for any purpose, the sales of chemicals in West Sulawesi were significantly higher than in West Sumatra. The highest sales of agro-chemicals in this region were insecticides. This followed by fungicides and herbicides, accounted for 92%, 86% and 83% respectively. The figure shows the sales of rodenticides, disinfectant and bio-pesticides in West Sulawesi was slightly higher than that of in West Sumatra that means the cocoa farmers in West Sulawesi use higher volume

of chemicals compared to West Sumatra. Thus, providing more training, particularly on pesticides use and cocoa safe is significantly required to minimize the using chemicals in cocoa farm.

vii. Major customer: These agro-dealers mainly targeted farmers as their customer. These agro-dealers take an advantage from the limited knowledge on pesticides use and the dangerous of using pesticides.

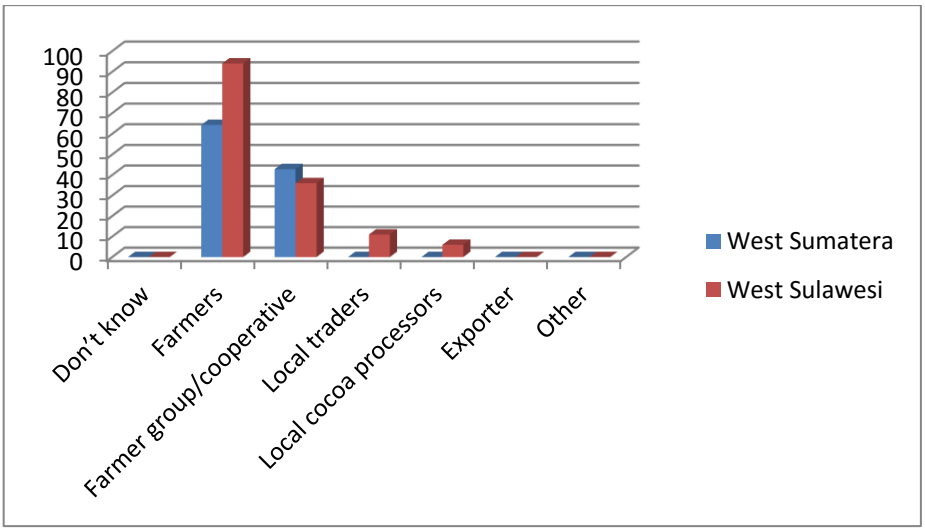

Figure 35. Major customer of chemicals in West Sumatra and West Sulawesi

Figure 35 shows in both regions, majority of the direct customers of agro-dealers were farmers, followed by farmer groups and cooperatives. Local trades and cocoa processors were also reported to purchase agro-chemicals in West Sulawesi.

There was 64.28% and 94% of the agro-dealers in West Sumatra and West Sulawesi respectively informed their major customer was farmers followed by farmer group/cooperative. This means that farmer group/cooperative actively support farmers by providing chemicals. This brings benefits for smallholder farmers because commonly buying chemicals or other agriculture input from farmer group/cooperative can be paid after harvest season or through credit scheme. Therefore, farmers who have minimum capital this buying system will be very useful. Further, this will increase the productivity, production and farmers' income.

vii. Other products provided by agro-dealers: In order to understand the role of agro-dealers in major cocoa producing region, the baseline survey also sought to tease out other products provided by agro-dealers. Figure 36 shows that in both regions, most agro-dealers also provided fertilizers, spraying equipment and seeds.

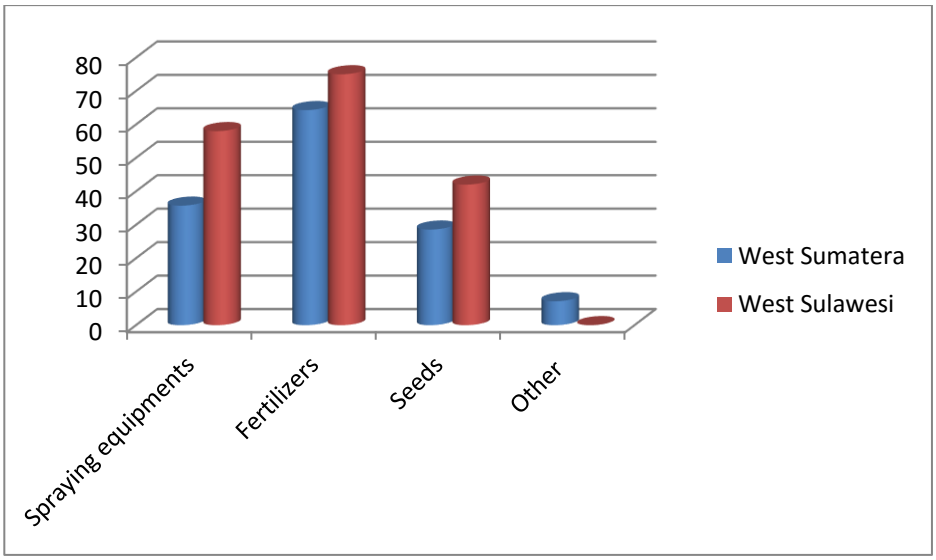

Figure 36. Other agro-inputs provided by agro-dealers at the kiosk in West Sumatra and West Sulawesi

The role played by agro-dealers is quite significant as they provide a one stop shop, reducing the time, effort, and logistics needed by farmers to travel out to purchase input, supplies and seeds. Therefore, it is important to establish formal regulation in ensuring the quality, reliability and a certain level of knowledge and awareness of safe handling and proper use of inputs amongst the agro-dealers.

On top of physical products, agro-dealers in both West Sumatra and West Sulawesi provide services such as providing space for farmers to show and sell products, as a broker/middle man in selling farmer's products, as a broker/middle man in selling of farmer's cooperative products, and giving credit to farmers. As shown in Figure 37, the main service sought from agro-dealers in West Sulawesi is the provision of credit to purchase agricultural inputs and also household needs. In West Sumatera however, the main service sought is brokerage of cocoa products.

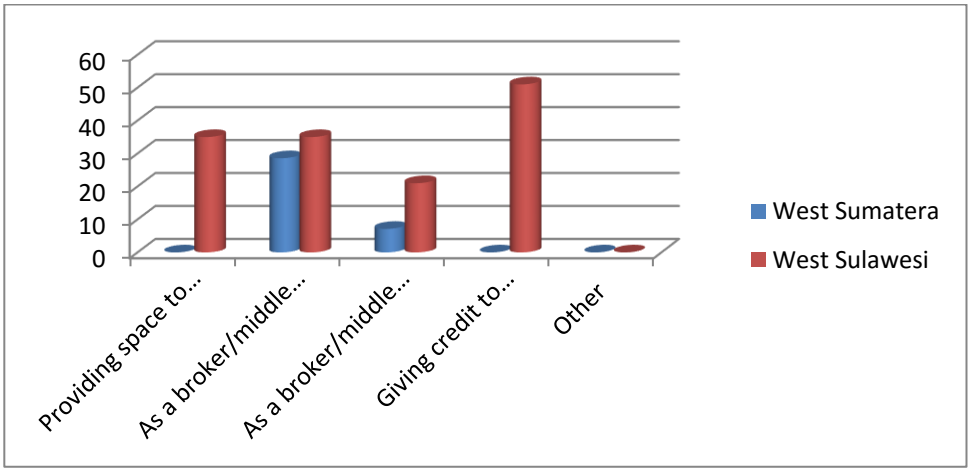

Figure 37. Additional roles beside agro-dealer in West Sumatra and West Sulawesi

viii. Pesticides sales record

This baseline survey asked whether agro-dealers do recording the pesticides sales in the last 2 years. This information will also useful to understanding the use of pesticides in the farmers' level. The result inter- related with the record of pesticides sales in the last 2 years (Fig. 38). The percentage of agro-dealers who record the sales of pesticides in West Sulawesi was higher than in West Sulawesi. This figure also shows that the record of insecticides sales in West Sulawesi was the highest compared to others, which was accounted for 31%.

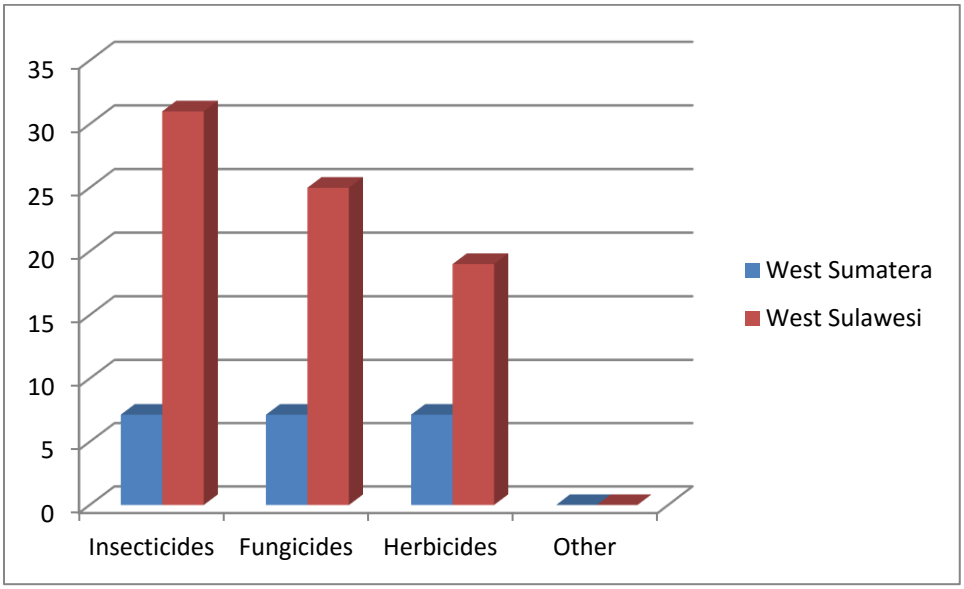

Figure 38. Pesticides sales record in the last 2 years in West Sumatra and West Sulawesi

ix. Complaints of fake pesticides: Figure 39 shows that only ~4% complaints were received by agro-dealers about fake insecticides and herbicide from West Sulawesi. Hence, there is a need for legislation and enforcement on the production and distribution of pesticides to protect farmers and ensure safety of agricultural crops. Stakeholder support is also required to minimize the negative impacts of fake pesticides along the supply chain.

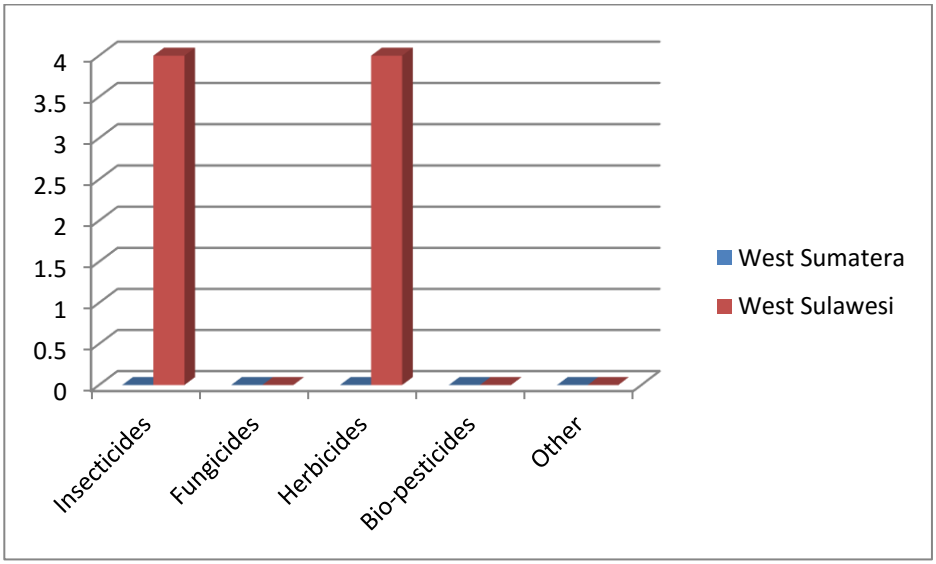

Figure 39. Complaints received by agro-dealers related to the issues of fake pesticides in the last 2 years

x Mixing individual chemicals then supply the mixture to others: Adulteration of agro-chemicals to increase agro-dealers' profit is a key concern. The results in Figure 40 shows that there were a small minority who sold adulterated agro-chemicals in both West Sumatera and West Sulawesi.

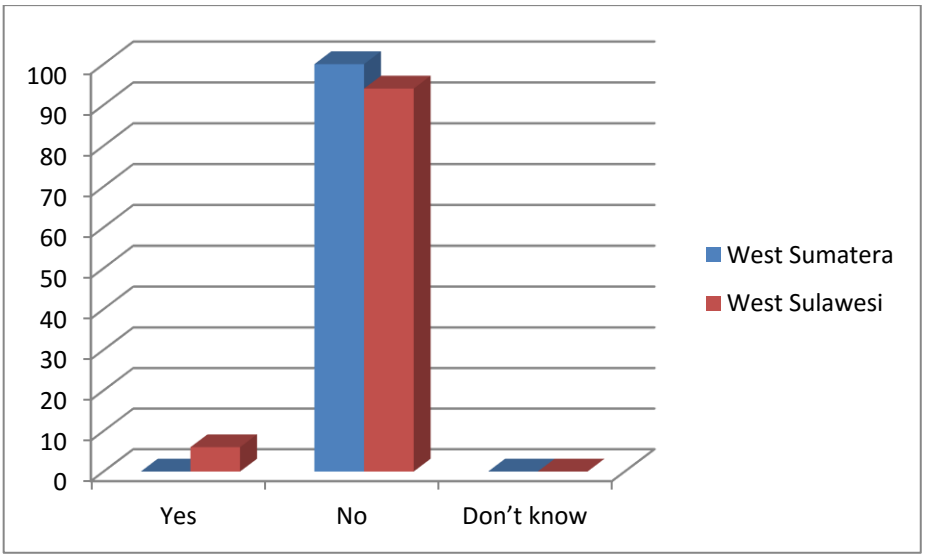

Figure 40. Agro-dealers do mixing the individual chemicals then supply the mixture to customer

xi. Company/organization receive information on pesticides use

Only about 30% of agro-dealers in West Sumatra and ~45% of agro-dealers in West Sulawesi received information on pesticide use (see Figure 41). A larger majority, 65% in West Sumatera and ~80% in West Sulawesi, does not receive information on GAP and food safety (see Fig. 42).

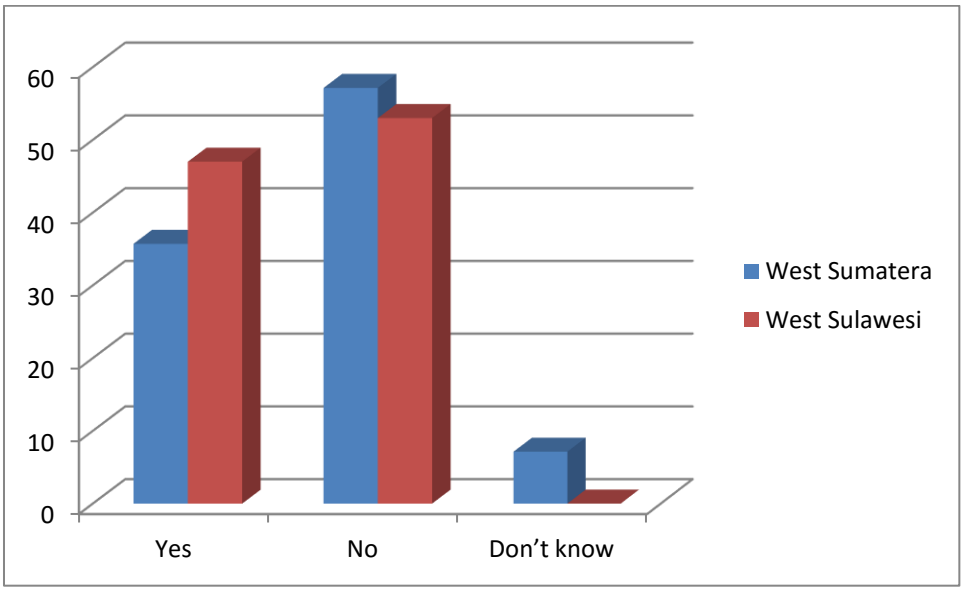

Figure 41. Company/organization receive information on pesticides use

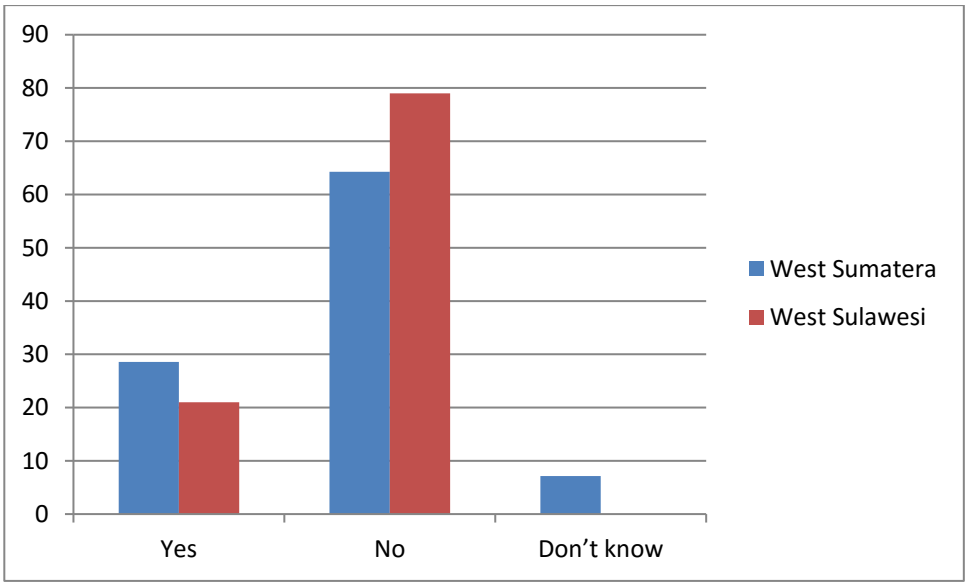

Figure 42. Agro-dealers received information on GAP and food safety

C) Agro-processors

TOFs for agro-processors were conducted in Lampung, Central Sulawesi and South Sulawesi. Each training has a participant of 20 agro-processors. Information gleaned from the baseline survey for agro-processors provided below:

i. Type of organization: Agro-processors consisted of farmer groups, cooperatives, local buying company and chemical retailers. In Lampung, 78% of the respondents were local buyers. In Central Sulawesi and South Sulawesi however, farmer groups accounted for the majority of agro-processors, who bought cocoa beans from farmers (see Figure 43).

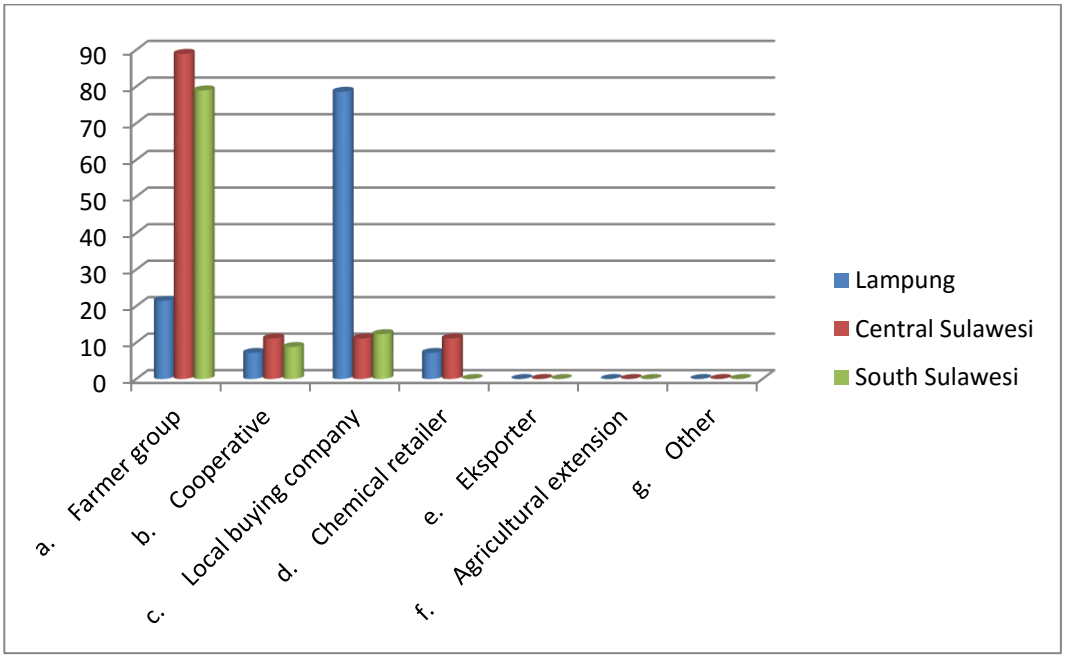

Figure 43. Types of organization the agro-processors

ii. Source and supply of cocoa beans

The agro-processors purchased cocoa beans from varied sources - farmers, farmer groups and local buying company. Figure 44 shows that the majority of agro-processors in the three regions obtained beans directly from farmers.

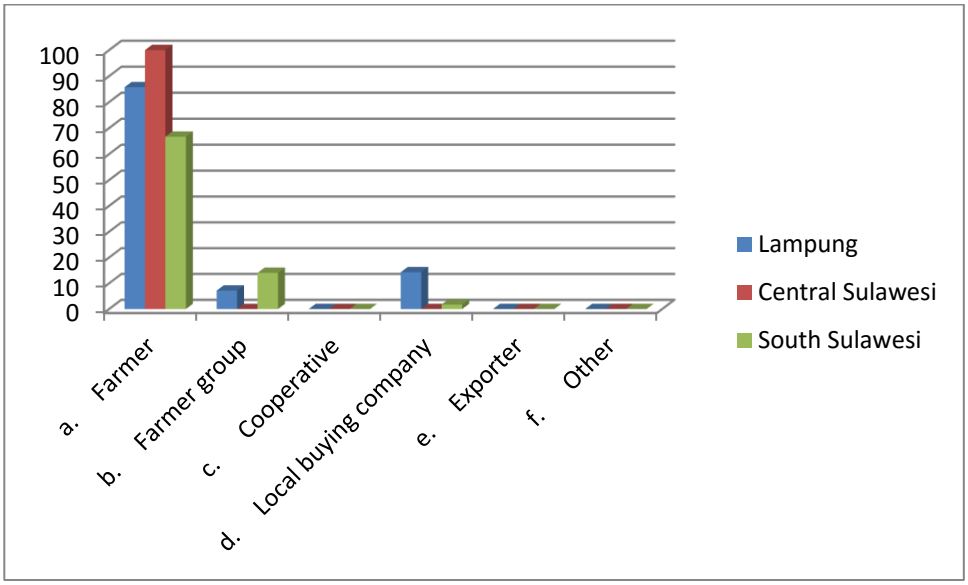

Figure 44. The source of cocoa bean on market chain

Baseline survey for agro-processors shows the majority of respondents in Central Sulawesi supply cocoa directly to cooperative. Meanwhile, the majority of respondents in Lampung and South Sulawesi supplied their cocoa directly to local buyer company. This indicates the market chain in Central Java is longer than that of in two other cocoa producing areas, namely Lampung and South Sulawesi (Fig. 45.).

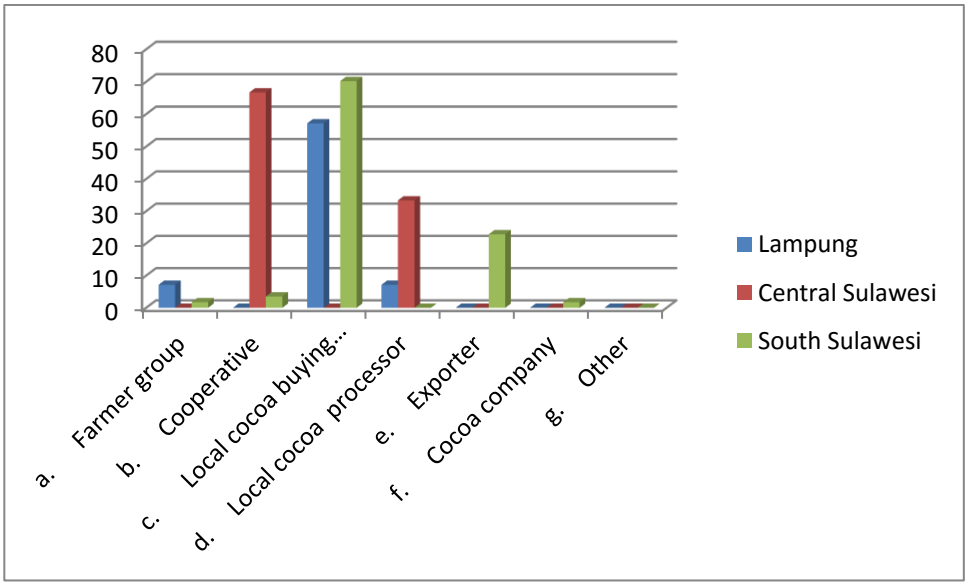

Figure 45. The direct supply of cocoa bean in the market chain

iii. Cocoa Storing

Figure 46 shows that there was a variation in the number of respondents storing cocoa bean in warehouses, packs in sacks and placed either on the floor or in racks. Central Sulawesi had the most number of respondents who stored beans in warehouses (~100%), followed by South Sulawesi (~70%) and Lampung (>60%). The percentage of agro-processors in Central Sulawesi, South Sulawesi and Lampung who stored cocoa in sacks on the racks was approximately 33%, 31% and 21% respectively. Meanwhile the percentage of agro-processors who stored cocoa beans in sacks placed in the floor in Central Sulawesi, South Sulawesi and Lampung was about 66%, 68% and 42%, respectively. The information suggested that the agro-processors in the three cocoa producing regions have adequate knowledge on proper storage of cocoa and the limiting factor is warehouse ownership.

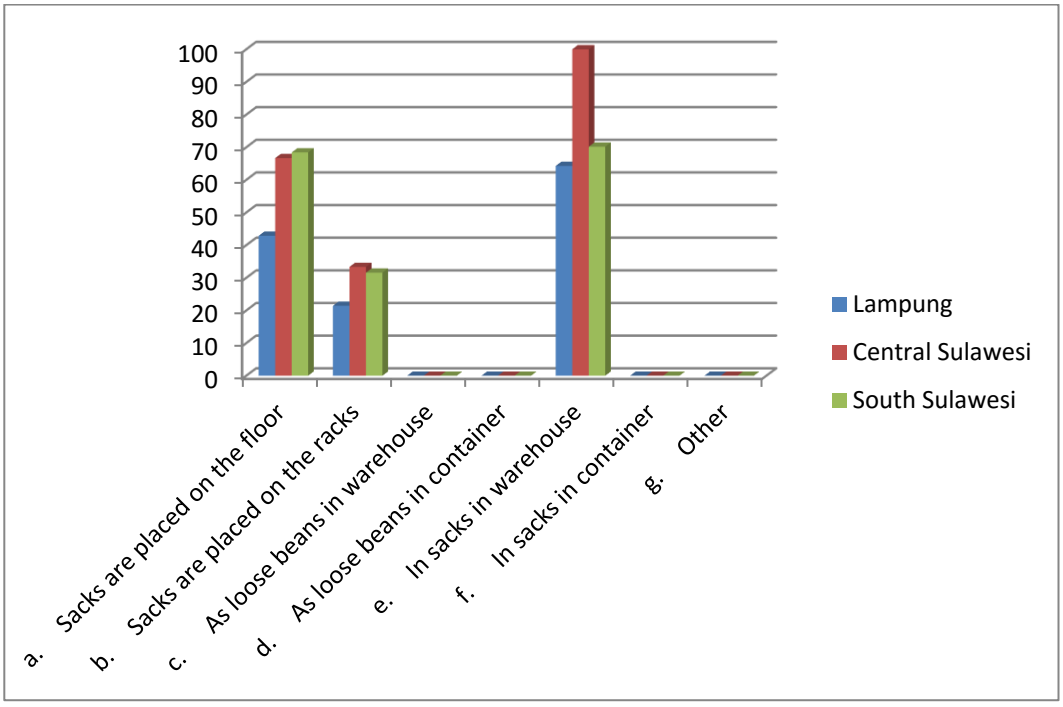

Figure 46. The method on storage the cocoa bean by agro-processor in some cocoa regions

iv. The most important standard of cocoa beans

Respondents were also questioned on the quality indicators to elucidate their awareness of standards on cocoa. Figure 47 showed that the majority of agro-processors from Central Sulawesi were aware of the quality indicators required for compliance to export standards i.e. properly fermented beans, absence of foreign matters, moisture content of < 7.5%, amount of waste beans < 2% and the absence of smoke / foreign odours.

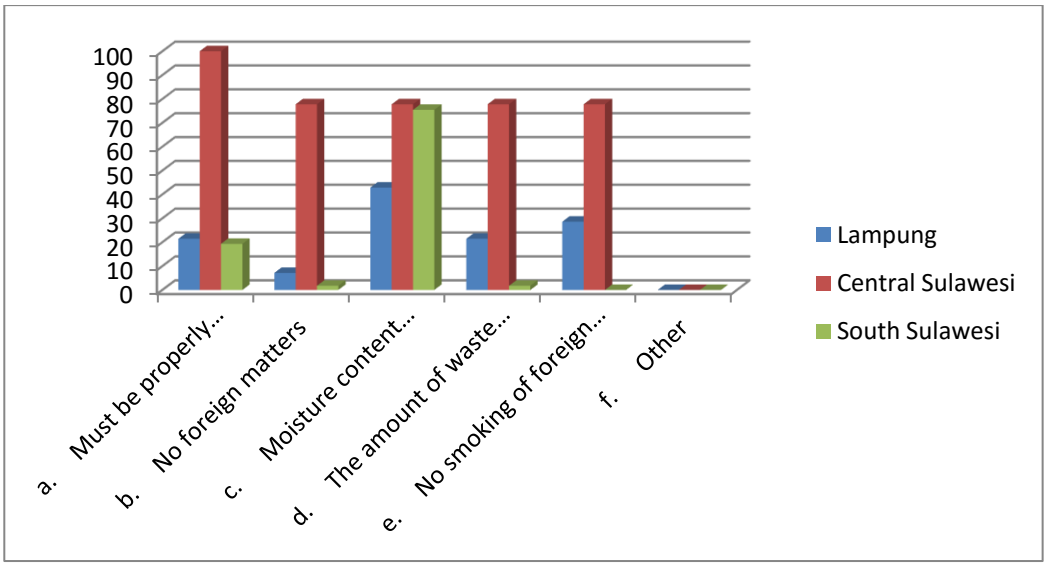

Figure 47. The most important standard of cocoa beans

Overall, the response from both Lampung and South Sulawesi was lower compared to Central Sulawesi; respondents from both regions rated moisture content of beans as the priority quality indicator for cocoa.

v. Storing other product alongside with cocoa beans

Majority of agro-processors in Lampung, Central Sulawesi and South Sulawesi stored cocoa separately and did not mix with other commodity products (see Figure 48). This may because the majority of agro-processors were farmer groups purchasing only cocoa and may have limited capital to purchase other commodities.

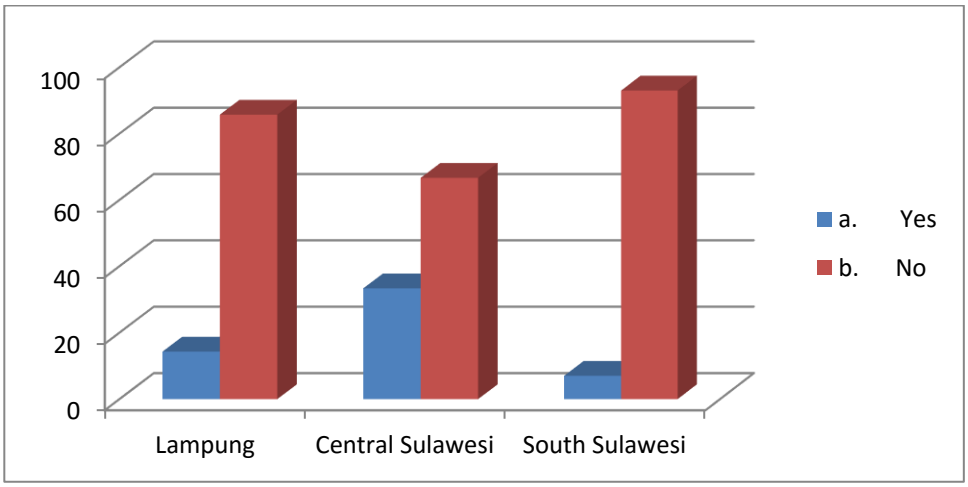

Figure 48. Processors who store other products alongside cocoa bean

vi. Pest problems

Fungal contamination is a major issue for stored cocoa as reported by agro-processors from Lampung, Central Sulawesi and South Sulawesi, followed by rodents. Insect pests were reported only from Lampung and South Sulawesi (see Figure 49). Fungal contamination is most likely due to the short drying process as the farmers tend to sell wet or semi dry cocoa (high moisture content). Improper warehouse conditions also contribute to fungal growth of stored beans.

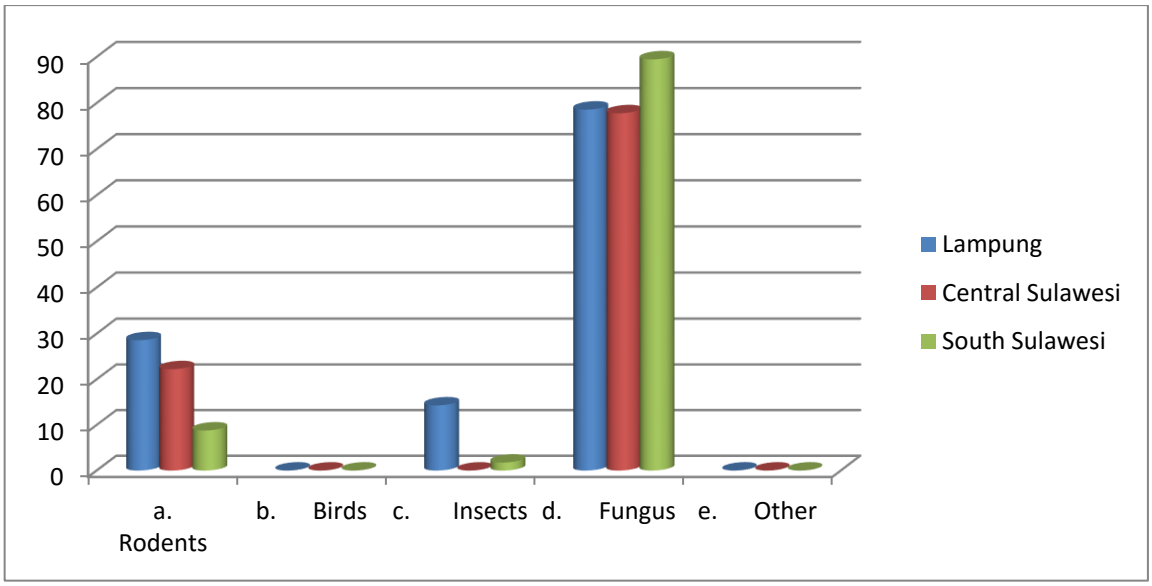

Figure 49. The pest problems found during cocoa storing by agro-processors

vii. Access to information on the use of chemicals for storing cocoa beans

Information and knowledge play important role in the developing cocoa sector in Indonesia. However, as shown in Figure 50, a majority of the respondents from Lampung, Central Sulawesi and South Sulawesi have very limited information on chemical use for storage - approximately 64%, 77% and 64% respectively. This reflects the prevailing sentiment that the use of chemicals is still not considered as an important aspect that influences stored bean quality, price and safety.

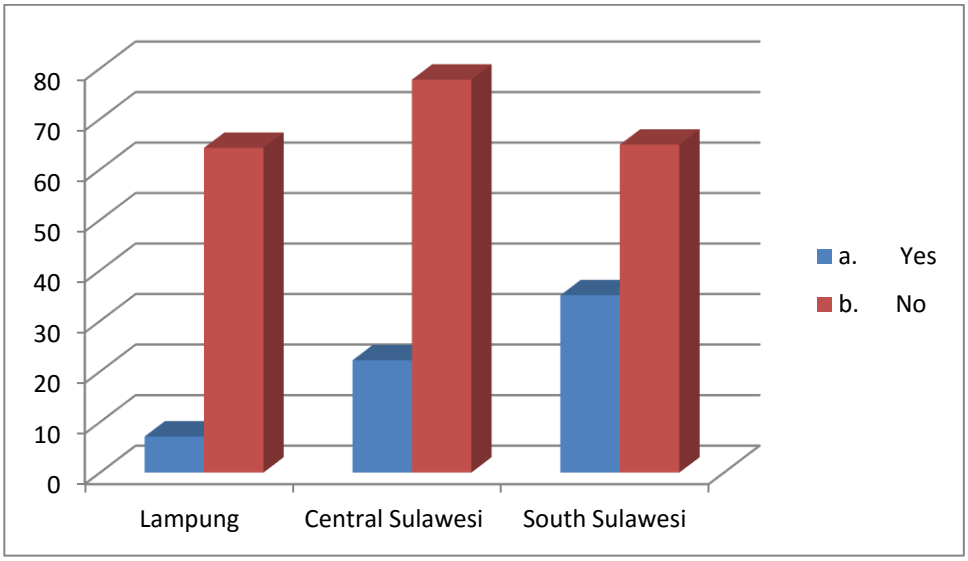

Figure 50. Processors' access to information related to chemicals use

viii. Chemicals applied directly to cocoa beans

This part of the survey aimed to find out if agro-processors sprayed chemicals (if any) directly onto the stored bean, as part of food safety compliance check. Figure 51 shows that majority of respondents in did not apply chemicals directly onto cocoa beans (Lampung - 90%, Central Sulawesi - 85% and South Sulawesi - 75%). It indicates the majority of agro-processors having knowledge and understanding the spraying chemicals directly to cocoa beans is harmful for consumers. However, in order to reduce the application of chemicals in agro-processors, there need more training to do proper storage of cocoa bean.

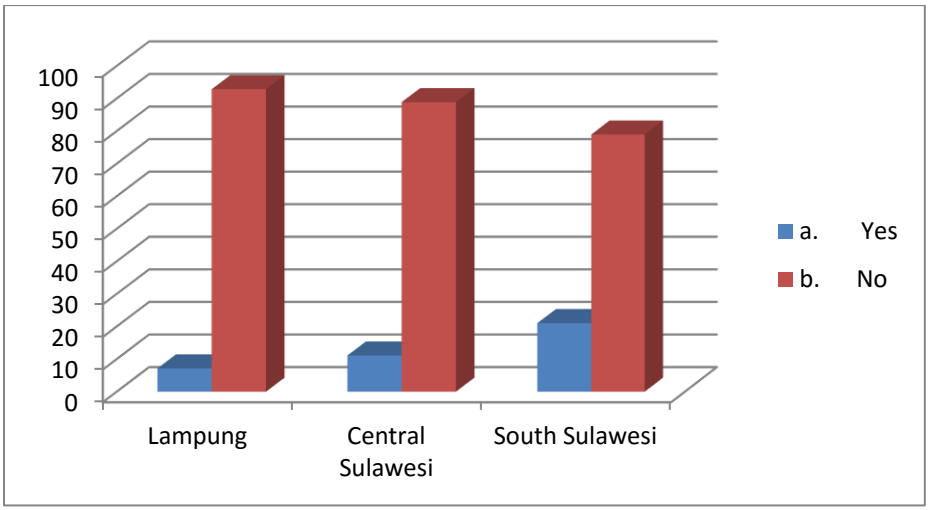

Figure 51. Chemicals directly applied by processors in Lampung, Central Sulawesi and South Sulawesi

ix. Have sent beans for chemical analysis related to food safety?

Figure 52 indicates that laboratory analysis on cocoa beans is rarely done by agro-processors in Indonesia, particularly by small-scale agro-processors due to the high cost for the analysis and the lack of awareness on food safety and quality indicators.

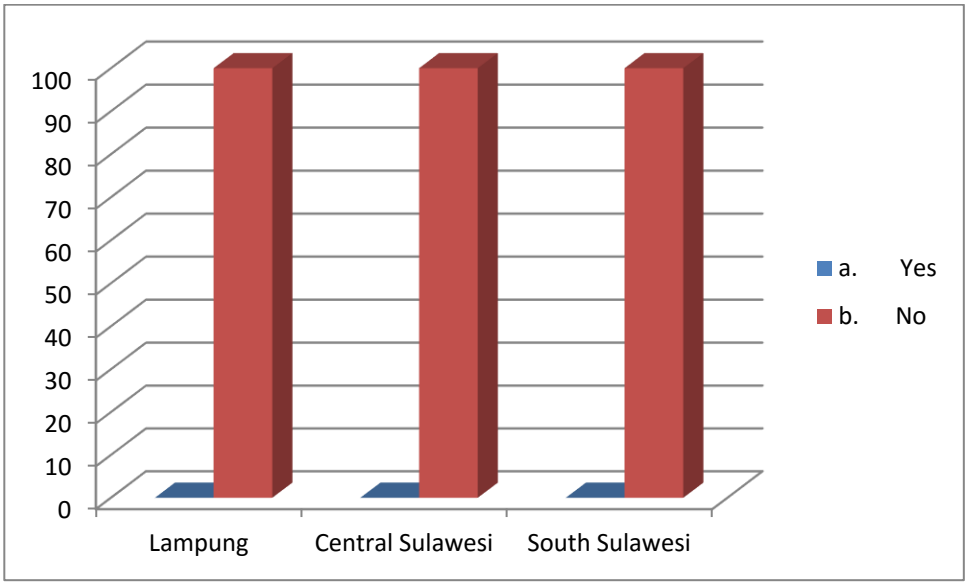

Figure 52. Processors send cocoa beans for chemical analysis

x. Do re-dry cocoa beans?

As indicated above, many of the respondents did not dry cocoa beans properly (sold either wet or semi-dry high moisture content of >7.5%. The high moisture content affects quality and ultimately the selling price in the global market. Figure 53 shows that agro processors re-dried the beans: Central Sulawesi (45%) followed by South Sulawesi (38%) and Lampung (22%).

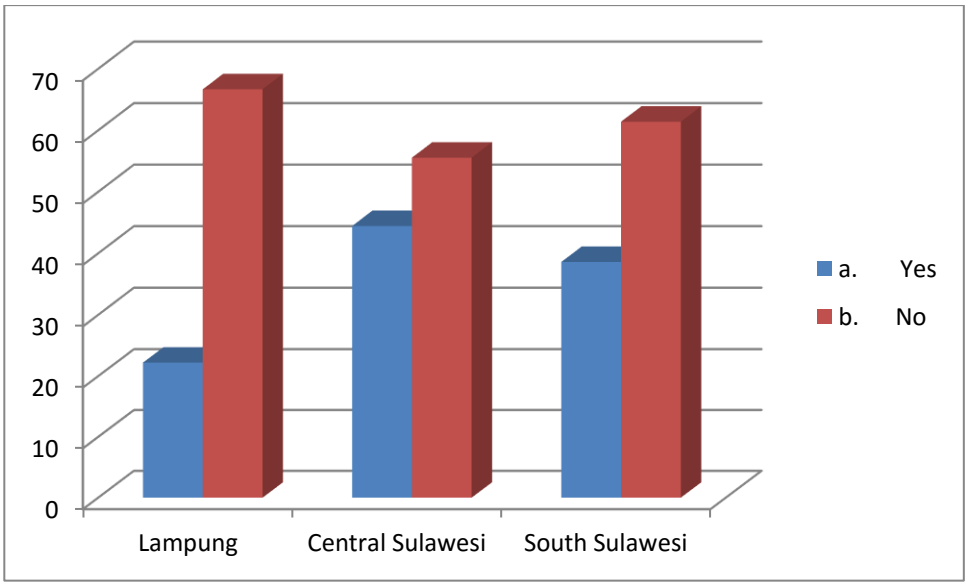

Figure 53. Agro-processors do re-dry cocoa beans in Lampung, Central Sulawesi and South Sulawesi

5.7. Impact assessment survey

Impact assessment survey was carried out to evaluate the impact of trainings of facilitator (TOFs) that were organized for farm leaders, agro-dealers and agro-processors. The project team could only collect data from selected locations (fewer compared to baseline survey) due to budget constraints and logistics issues. The impact survey used the same questionnaire as per baseline study so that comparison of responses could be made.

The locations of the impact assessment surveys were:
Farmers - East Java and Southeast Sulawesi;
Agro-dealers - West Sumatra; and
Agro-processors - Central Sulawesi and Lampung.

The numbers of respondents in location varied:
Farmers - East Java (18) and Southeast Sulawesi (16);
Agro-dealers – West Sumatra (7); and
Agro-processors - Lampung (20) and Central Sulawesi (10 participants).

The impact surveys were carried out in November 2015 in Southeast Sulawesi and in January 2016 in East Java.

A) Farmer leaders

i. **Productivity**
The expected outcome after the TOFs for farmers was that productivity would increase. However, the impact survey found that the productivity of cocoa plantation in both areas after TOFs was lower than that of before TOFs. According to Table 10, the average of cocoa productivity in East Java before TOF was 509.28 kg/ha/year, while the average cocoa productivity after TOF was 430.55 kg/ha/year. In Southeast Sulawesi, the average of cocoa productivity before TOF was conducted in this area was 825 kg/ha/year, and decreased slightly into 800 kg/ha/year after the TOF. The decline was due to the dry and extreme weather conditions that El Nino caused in 2015.

Table 10. Cocoa farm characteristics in East Java and Southeast Sulawesi

No.	Characteristics	East Java	Southeast Sulawesi
1.	The farmer's ownership on cocoa trees (%)		
	a. 1-100	10	0
	b. 101-200	47	6.25
	c. 201-500	16	0
	d. 501-1000	31	18.75
	e. 1001-2000	0	12.5
	f. > 2000	0	62.5
2.	Number of cocoa plots	1.74	2.44
3.	Area of cocoa farm (ha)	0.62	2.34
4.	Age of cocoa trees (years)	8	13.5
5.	Productivity (kg/ha/year)	509.28	825

ii. Pesticide use

TOF for farmer leaders promoted the adoption of GAP and SPS to increase cocoa productivity and improve cocoa quality. As shown in Table 11, in East Java, more respondents used inorganic fertilizers and pesticides. In Southeast Sulawesi however, more respondents pruned their trees and controlled the growth of weeds. On a more positive note still, there were less respondents who applied pesticides.

Table 11. The impact of TOF on production system

No.	Indicators	East Java		Southeast Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Fertilizing (times/year)	1.42	1.45	1.62	1.62
	Average volume of fertilizer (kg/ha/year)	241.9	582.22	314.28	314.28
	Farmers using organic fertilizer (%)	89.47	89.47	68.75	31.25
	Farmers not using organic fertilizer (%)	11	10.52	31.25	68.75
2.	Weeding (times/year)	2	2.1	2.14	2.5
3.	Pruning (times/year)	2.1	1.72	1.81	2
4.	Interval harvest (days)	10	6.5	13.5	11.28
	Average number of harvest (times/year)	36	21.8	9.12	13.16
5.	Farmers using pesticides (%)	42	47.37	100	81.81
	Farmers not using pesticides (%)	58	52.63	0	18.18
	Average spraying pesticides (times/year)	1.42	1.68	14.87	13.2

iii. Farm sanitation

Table 12 shows the TOF have improved the sanitation in the cocoa farms. In both East Java and Southeast Sulawesi, more farmers removed diseased/black pods and either buried or burned the pods. In East Java, the percentage of farmers who did nothing decreased significantly, from 30% to 5.26%. The percentage of farmers who do nothing in Southeast Sulawesi also decreased from 12.5% to 6.25%.

Table 12. The TOF impact on farm sanitation

No.	Indicators	East Java		Southeast Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Percentage farmers remove all diseased/black pods (%)	45	30	75	93.75
2.	Percentage farmers remove and burry all diseased/black pods (%)	25	65	68.75	93.75
3.	Percentage farmers remove and burn all diseased/black pods (%)	0	0	37.5	50
4.	Percentage farmers do nothing (%)	30	5.26	12.5	6.25

iv. Major problems in cocoa farm

Pest and diseases are the main problems in cocoa farming. Cocoa pod borer (CPB), Hellopeltis, vascular-streak dieback (VSD) and Phytophthora pod rot (PPR) are the most important pest and diseases in cocoa farm. The attack of these pest and diseases will affect significantly to yield decrease.

One of the topics of TOFs was the method for controlling pest and disease. Table 13 shows there were some pest and diseases attack, such as rats, squirrel, Hellopeltis, stem cancer and pod rot in cocoa farm in East Java which affect significantly the decreasing cocoa productivity. Meanwhile, the attacks of rats, cocoa pod borer, hellopeltis, VSD, stem cancer and pod rot decreased steadily. Thus, there was a positive impact of TOF in both regions in controlling pest and diseases problem.

Table 13. The impact of TOF on pest and diseases incidence

No.		East Java		Southeast Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Rats (%)	57.89	47.37	87.5	81.25
2.	Squirrel (%)	78.94	68.42	87.5	87.5
3.	Wild pigs (%)	0	0	6.25	6.25
4.	Cocoa pod borer (%)	52.63	68.42	100	93.75
5.	Hellopeltis (%)	57.89	36.84	93.75	75.0
6.	VSD	36.84	36.84	93.75	75.0
7.	Stem cancer (%)	63.16	52.63	100	75.0
8.	Pod rot (%)	78.95	63.15	100	87.5
9.	Fertilizer (%)	47.39	36.84	31.25	31.25
10.	Health problems (%)	5.26	5.26	0	6.25
11.	Labour shortage (%)	0	10.52	0	6.25

v. Post harvest handling and bean fermentation

There were indications of improvements as per Table 14.

Table 14. The impact of TOF on post harvest handling and fermenting bean

No.		East Java		Southeast Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	*Harvest method*				
	a. Select the ripe pod (%)	84.21	78.95	43.75	50
	b. Mixing the ripe and unripe pod (%)	31.58	5.26	68.75	50
	c. Using harvest tool (%)	52.63	68.42	31.25	56.25
	d. Others (%)	0	10.52	18.75	18.75
2.	*Time of pod breaking*				
	Directly after harvest (%)	52.63	52.63	87.5	81.25

	Waiting till enough volume (%)	31.58	15.79	25	31.25
	After 3 day (%)	10.52	10.52	0	0
	After 1 week (%)	0	5.26	0	0
	Other (%)	0	0	0	0
3.	*How to break pod?*				
	a. Using sharp knife (%)	42.10	21.05	37.5	25
	b. Using blunt tool (%)	52.63	42.10	62.5	81.25
	c. Mixing all the bean (%)	26.31	5.26	31.25	6.25
	d. Sort out the infected bean (%)	52.63	52.63	0	0
	e. Select the normal bean (%)	15.79	42.10	68.75	68.75
4.	*Cocoa shelling*				
	a. Shel the wet bean (%)	5.26	5.26	31.25	25
	b. Shel the unfermented bean (%)	15.79	15.79	50	50
	c. Shel the fermented bean (%)	78.95	68.42	43.75	43.75
5.	*Fermentation method*				
	a. Burried underground (%)	0	15.38	0	6.25
	b. Using bamboo basket (%)	20	15.38	43.75	43.75
	c. Using wooden box	58.95	30.77	0	0
6.	*The frequency of stirring during fermentation*				
	a. Every day (%)	0	0	0	0
	b. Ones time (%)	6.67	10.52	6.25	0
	c. Two times (%)	53.33	36.84	0	0
	d. Nothing (%)	40	0	31.25	0
7.	Mixing the harvested bean during fermentation process				
	a. Mix the first and second harvest (%)	6.67	5.26	0	6.25
	b. Mix the first, second and third harvest (%)	6.67	10.52	0	0
	c. Mix all the harvested bean (%)	6.67	0	0	6.25
	d. Not mixing (%)	80	84.21	43.75	31.25

In East Java, although there was a decline in the number of respondents who selected ripe pods for harvest, more respondents were using proper harvesting tools to collect pods. Only 5.3 % reported to have mixed ripe and unripe pods together, a significant decrease from pre-TOF. In terms of pod breaking, there was less who waited until there was enough volume of pods before breaking, and more who broke pods after 7 days. The percentage of respondents who used sharp knife and blunt tool to break pods decreased, but more respondents only kept normal beans for further processing. The percentage of respondents who shelled wet bean and unfermented beans remained unchanged; percentage that shelled fermented beans decreased. Compared to pre-TOF, a higher percentage of respondents reported to have turned beans one time during fermentation process, mixed the first, second and third harvest, and inversely, did not mix beans from different harvest times.

As for Southeast Sulawesi, the percentage of respondents who selected only ripe pods for harvest and used the proper harvest tool increased. Unlike East Java, more respondents said that they broke pods only after they have gathered enough volume of pods. More respondents also reported that they used blunt tools to break pods (as advocated by TOF). The numbers remain unchanged in terms of bean shelling. The percentages of respondents reported to have mixed the first and second harvest and all beans increased, while that who did not mix beans decreased.

vi. Cocoa drying

Table 15 shows that in pre- and post-TOF, all 100% respondents in East Java practiced sun drying to dry their cocoa beans. Post-TOF saw fewer respondents drying beans on plastic sheets, and more using tarpualin and directly on cemented floors.

Table 15. The impact of TOF on drying process of cocoa bean

No.		East Java		Southeast Sulawesi	
		Before TOF	**After TOF**	**Before TOF**	**After TOF**
1.	Using sun drying				
	a. On the ground (%)	0	0	12.5	0
	b. Plastics (%)	15.79	10.52	12.5	12.5
	c. Terpaullin (%)	5.26	26.31	37.5	43.75
	d. Cement floor (%)	52.63	63.16	6.25	6.25
	e. Bamboo racks (%)	21.05	21.05	87.5	93.75
2.	Using artificial heat/dryer				
	a. Wood fire (%)	0	0	75	50
	b. Diesel dryer (%)	0	0	0	0
	c. Electrical dryer (%)	0	0	6.25	0
	d. Others (%)	0	0	0	0

Cocoa farmers in Southeast Sulawesi practiced two drying methods - sun drying and machine drying – even after attending TOF. On a more positive note however, less respondents used wood-fired artificial dryer post-TOF and direct drying on the ground, and more used bamboo racks and tarpaulin sheets to dry the beans, suggesting that farmers integrated the knowledge learnt from TOF into practice.

vii. Cocoa storing

Table 16. The impact of TOF on cocoa storing

No.	Indicators	East Java		Southeast Sulawesi	
		Before TOF	**After TOF**	**Before TOF**	**After TOF**
1.	Storage of cocoa beans				
	a. As loose beans in house (%)	26.31	15.79	12.5	18.75
	b. In sacks in house (%)	42.10	57.89	12.5	6.25
	c. As loose beans in warehouse (%)	0	5.26	0	0
	d. In sacks in warehouse (%)	5.26	21.05	18.75	12.5
2.	Store other products alongside cocoa beans				
	a. Yes (%)	0	0	0	0
	b. No (%)	100	100	100	100
	c. What other products stored with cocoa beans	--	--	--	--

viii. Information on Good Agricultural Practices (GAP)

The other aim of the TOF was to disseminate knowledge, technology and market information to other cocoa farmers. Table 17 shows that most trained farmer facilitators in both regions shared knowledge gained from TOF to neighbours, friends, family members and other farmers. In East Java, most participants (77.77%) share their knowledge to their family and friends informally, about 22.22% and 33.33% of participants shared knowledge through formal training and farmer group meeting. There was only a small number of active farmer groups. On the other hand, many of the trained farmers in Southeast Sulawesi shared knowledge, technology and market information through farmer group meeting as each village in the region formed an economic organization of farmers which be called LEM (Lembaga Ekonomi Masyarakat) in which farmers actively facilitated access to information and capital.

Table 17. The impact of TOF on accessing GAP information

No.	Indicators	East Java	Southeast Sulawesi
		After TOF	After TOF
1.	Provided information gathered from TOF		
	a. Yes (%)	83.33	100
	b. No (%)	16.67	0
2.	Information shared through:		
	a. Training	22.22	0
	b. Farmer group meeting	33.33	93.75
	c. Shared to friends and family	77.77	12.5
	d. Others	15.79	0
3.	Participants	Neighbors, friends, family, farmers	Neighbors, friends, family, farmers
5.	Topics	Pruning, GAP, post-harvest handling, fermentation, sanitation, pest and diseases control	Pruning, pesticides use, spraying, fertilizing, sanitation

In East Java, the topics relayed to others were fertilizers, pruning, weeding, controlling pest and diseases, harvesting, bean fermentation, drying, storing and sanitation. Meanwhile, in Southeast Sulawesi only pruning, pesticides use, fertilizing and sanitation topics were shared.

ix. Pesticide use

In Indonesia, most smallholder cocoa farmers control pest and diseases by spraying pesticides even though it incurred higher cost. Spraying pesticides was considered as the easy way for controlling pest and diseases because many agro-dealers sell various pesticides. However, cocoa farmers relatively had limited knowledge and skills on using pesticides properly.

Table 18. The impact of TOF on chemicals and pesticides use in cocoa farms

No.	Indicators	East Java		Southeast Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Using chemicals				
	a. Yes (%)	57.89	78.94	100	93.75
	b. No (%)	42.10	21.05	0	6.25
2.	Using non branded chemicals				
	a. Yes (%)	36.84	0	0	0
	b. No (%)	63.16	100	100	100
3.	Reasons why non-branded chemicals are not applied				
	a. Not necessary (%)	16.67	10.52	0	0
	b. Not available (%)	0	0	0	0
	c. Too expensive (%)	0	5.26	0	0
	d. Don't know how to use (%)	25	10.52	0	0
	e. Too dangerous to use (%)	50	36.84	0	6.25
	f. Others	25	0	0	0
4.	Keep records of chemicals used in farm				
	a. Yes (%)	0	0	87.5	93.75
	b. No (%)	100	100	12.5	6.25
5.	Clothing or equipment is worn when the chemicals are applied				
	a. None (%)	0	0	0	0
	b. Don't know (%)	0	5.26	0	0
	c. Hat(%)	52.63	89.47	87.5	100
	d. Gloves (%)	31.58	78.95	37.5	50
	e. Rubber boots (%)	36.84	78.95	75	87.5
	f. Overalls or over trousers (%)	47.39	42.10	43.75	62.5
	g. Apron (%)	5.26	5.26	0	0

h. Coat (%)	5.26	5.26	0	0
i. Eye glasses (%)	15.79	26.31	12.5	12.5
j. Mask for nose and mouth (%)	42.10	78.95	75	75
k. Full face mask	10.52	10.52	12.5	18.75
l. Others	0	0	0	0

As shown in Table 18, only farmer respondents in Southeast Sulawesi reduced their use of pesticides after TOF. Farmers from both regions used only branded chemicals post-TOF. In the case of East Java, reasons cited included not necessary, too expensive, lack of knowledge on use and too dangerous for use. In Southeast Sulawesi, the main reason was that non-branded chemicals were too dangerous for use. Only farmers in Southeast Sulawesi kept records of chemicals used (percentage increased after TOF). In terms of safety clothing or equipment used during pesticide application, there was an increase in the percentage of respondents who worn hats, gloves, rubber boots, eyeglasses and masks post-TOF. Similarly, for Southeast Sulawesi, percentage of respondents who used the abovementioned protective gears (incl. overalls or over trousers and full face mask) increased post-TOF.

B) **Agro-dealers**

Only 14 agro-dealers in West Sumatra responded to the survey, and were mainly retailers (71.43%) and farmer groups/cooperatives (28.57%) (see Table 19). There was no change in the source of pesticides. However, the sales of insecticides, fungicides, biopesticides (specific to cocoa) increased after TOF, while the sale of herbicides went down. This could have been caused by a higher incidence of pest attack e.g. CPB and *Helopeltis*. Sales of general purpose agro-chemicals e.g. acaricides, disinfectants and biopesticides decreased. Post-TOF, more farmers and local cocoa processors purchased agro-chemicals directly from agro-dealers, and less sales from farmer groups / cooperatives.

Table 19. The impact of TOF on retailer activity of the trained agro-dealers in West Sumatra

No.	Questionary	Before TOF (n=14)	After TOF (n=14)
1.	**Type of organization (%)**		
	Retailer	71.43	71.43
	Farmer group/cooperative	28.57	28.57
	Others	0	0
2.	**Source of Pesticides**		
	Don't know	0	0
	Retailer	50.00	50,00
	Importer	7.14	7.14
	Producer of pesticides	28.57	28.57
	Others	28.57	28.57
3.	**Top sales of agro-chemicals in the last 2 years**		
	Insectisides	64.28	85.71
	Fungicides	42.85	85.71
	Herbicides	50.00	42.86
	Others	7.14	0
4.	**Top sales of agro-chemicals for cocoa in the last 2 years**		
	Insecticides	50.00	71.43
	Fungicides	28.57	57.14
	Herbicides	28.57	28.57
	Bio-pesticides	7.14	14.28
	Others	0	0
5.	**Type of chemicals sales for any purpose**		
	Don't know	0	0
	Fungicides	50.00	50
	Insecticide	78.57	78.57
	Herbicides	71.42	71.42
	Rodenticides	14.28	14.28
	Akarisida	35.71	0
	Desinfectantss	35.71	0

	Biopesticides	21.42	14.28
	Others	0	0
6.	**Type of chemicals sales for cocoa**		
	Don’t know	0	0
	Fungicides	21.4	57.14
	Insecticides	57.1	71.43
	Herbicides	50.0	28.57
	Rodenticides	7.14	0
	Akarisida	7.14	0
	Disinfectants	7.14	0
	Bio-pesticides	14,28	14.28
	None	7.14	0
	Other	0	0
7.	**Major customers**		
	Don’t know	0	0
	Farmers	64.28	100
	Farmer group/cooperative	42.85	14.28
	Local traders	0	0
	Local cocoa processors	0	14.28
	Exporter	0	0
	Others	0	0
8.	Beside pesticides do you also sell		
	Spraying equipments	35.71	35.71
	Fertilizers	64.28	71.43
	Seeds	28.57	28.57
	Other	7.14	0
9.	Additional roles beside agro dealer		
	Providing space to farmers to show and sale their products	0	0
	As a broker/middle man in selling farmers products	28.57	28.57
	As a broker/middle man in selling of farmers cooperative	7.14	7.14
	Giving credit to farmers	0	28.57
	Other	0	0
10.	**Have record of gro chemical sales in the last 2 years**		
	Insecticides	7.14	42.85
	Fungicides	7.14	42.85
	Herbicides	7.14	42.85
	Other	0	0
11.	**Any complaints of fake agro chemicals for cocoa in the last 2 years**		
	Insecticides	0	0
	Fungicides	0	0
	Herbicides	0	0
	Bio-pesticides	0	0
	Other	0	0
12.	**Ever mix individual chemicals that you received and then supply the mixture to others**		
	Ye	0	0
	No	100	100
	Don’t know	0	0
13.	**Organization/company currently provide information received from TOF**		
	Yes		42.86
	No		57.14
	Don’t know		0
14.	**Who receive the information**		
	Farmers		42.86
	Farmer group		14.28

	Don't know		0
15.	**Topics of information**	How to use pesticide and biopesticide	
16.	**How information provided**		
	Don't know		0
	Leaflet		14.28
	Magazine		0
	Newspaper		0
	Visit and discussion		28.57
	Radio		0
	TV		0
	Training to farmer group		42.85
	Demo plot		28.57
	Field visit		0
	Training to farmer		0
	Others		0
17.	**Organization/company aware that new regulations are being introduced in Europe and Japan concerning the levels of chemical residues permitted in cocoa beans**		
	Yes	28.57	71.42
	No	71.42	28.57

The number of agro-dealers who sold fertilizers increased indicating a higher demand of fertilizers in the area. The role of agro-dealers also expanded into credit providers. No reports/complaints were recorded on fake products / adulterated agro-chemicals.

Another role played by agro-dealers was the provision of information to farmer and farmer groups e.g. how to use pesticides and bio-pesticides safely, and new regulations on chemical residues permitted in cocoa beans. Methods of the information sharing varied, with the preferred method of trainings during farmer group meetings. The percentage of agro-dealers who became aware of the new Eu and Japanese regulations increased significantly from 28.57% before TOF to 71.42% after TOF.

C) Agro-processors

The number of respondents was 10 in Lampung and 20 in Central Sulawesi.

i. Cocoa processing volume

The results indicate majority of agro-processor respondents (78.57%) in Lampung was local buying companies, while majority of respondents (88.89%) in Central Sulawesi were farmer groups. Table 20 shows the processing volume of cocoa by agro-processors increased after TOF in both Lampung and Central Sulawesi. In Lampung, the average of volume handled by agro-processors before TOF was 49,607.14 kg/year increase to 55,963.25 kg/year. In Central Sulawesi, the volume increased significantly from 28,264 kg/year before TOF to 63,889 kg/year after TOF.

Table 20. Characteritics of farmer's organization related to cocoa trading

No.	Indicators	Lampung		Central Sulawesi	
		Before TOF	**After TOF**	**Before TOF**	**After TOF**
1.	Type of organization				
	a. Farmer group	21.43	21.43	88.89	88.89
	b. Cooperative	7.14	7.14	11.11	11.11
	c. Local buying company	78.57	78.57	11.11	11.11
	d. Chemical retailer	0	0	11.11	11.11
	e. Exporter	0	0	0	0
	f. Agricultural extension	0	0	0	0
	g. Other	0	0	0	0
2.	Buying cocoa directly from				
	a. Farmer	85.71	85.71	100	100
	b. Farmer group	7.14	7.14	0	0
	c. Cooperative	0	0	0	0

	d. Local buying company	14.28	14.28	0	0
	e. Exporter	0	0	0	0
	f. Other	0	0	0	0
3.	Directly supply cocoa to				
	a. Farmer group	7.14	7.14	0	0
	b. Cooperative	0	0	66.67	66.67
	c. Local cocoa buying company	57.14	57.14	0	0
	d. Local cocoa processor	7.14	7.14	33.33	33.33
	e. Exporter	0	0	0	0
	f. Cocoa company	0	0	0	0
	g. Other	0	0	0	0
3	Average dried cocoa beans handled (kg/th)	49,607.14	55,963.25	28,624	63,889

ii. Cocoa storage

On the whole, storage practices by agro-processors improved after TOF. In Lampung, there was an increase in the percentage of agro-processors who stored beans packed in sacks in warehouse. Beans were also stored away from other products e.g. brown sugar. Cocoa beans can absorb odors from surrounding area of storage. Therefore to maintain the quality of cocoa beans in the storage, the beans must be stored separately to prevent strong odors that could potentially affect the aroma of cocoa. In Central Sulawesi, storage practice was also improved with more sacks stored on racks rather than on the floor. There was also a drop in the percentage of respondents who stored cocoa beans alongside products such as dried coconut (copra), rice and bananas.

Table 21. The impact of TOF for processor on cocoa storing

No.	Storing of cocoa beans	Lampung		Central Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Storing cocoa				
	a. Sacks are placed on the floor	42.88	42.88	66.67	33.33
	b. Sacks are placed on the racks	21.43	21.43	33.33	66.67
	c. As loose beans in warehouse	78.57	28.57	0	0
	d. As loose beans in container	0	0	0	0
	e. In sacks in warehouse	64.28	78.57	100	100
	f. In sacks in container	0	0	0	0
	g. Other	0	0	0	0
2.	Store other product alongside the cocoa beans				
	a. Yes	14.28	0	33.33	22.22
	b. No	85.71	100	66.67	77.78
	Name of product	Brown sugar	0	Dried coconut, rice	Dried coconut, bananas

iii. Pest problems and pesticides use in the cocoa storage

Cocoa beans in storage are vulnerable to pests and diseases. In both Lampung and Central Sulawesi, fungal contamination and rodents were key threats. One of the objectives of the TOF for agro-processors was to reduce the pesticides use in storage, so as to comply with EU and Japanese safety standards.

The figures in Table 22 show that in general, less chemicals e.g. insecticides, rodenticides, fungicides and repellants were used to manage and control pest and fungal attack post-TOF. More chemical safe method to control rodents e.g. traps were used instead.

Table 22. The problems on cocoa storing and the control methods

No.	Problems on pest and diseases	Lampung		Central Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	The pest problems				
	a. Rodents	28.57	14.28	22.22	11.11
	b. Birds	0	0	0	0
	c. Insects	14.28	0	0	0
	d. Fungus	78.57	78.57	77.78	0
	e. Other	0	0	0	0
2.	Pesticides are using to control pests in stored cocoa beans				
	a. Rodenticide	0	0	33.33	22.22
	b. Insecticides	21.43	0	33.33	22.22
	c. Fungicides	0	0	22.22	22.22
	d. Traps	0	28.57	22.22	33.33
	e. Repellants	0	0	11.11	0
	f. Other	0	0	0	0

iv. Processors provided information gathered from TOF

Another objective of the TOF for agro-processors was to disseminate information and knowledge to other cocoa stakeholders. In Lampung, all trained agro-processors shared knowledge to others, while in Central Sulawesi, only 88.89% of the trained processors shared information and knowledge received from TOF (see Table 23).

Table 23. Pest problems and pesticides use in cocoa storage

No.	Quesionary the reason on pesticide use	Lampung		Central Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Have provided information about training results?				
	a. Yes		100		88.89
	b. No		0		11.11
2.	When information provided		When buying cocoa from farmers		When there is farmer group meeting
3.	Information provided for		Farmers, farmer group, collectors		Farmers, collectors, government in village level
4.	Places when information provided		Farmers' houses, farmer group		Farmers' cocoa farm, meeting room in farmer group
5.	Topics/kind information are shared		Cocoa beans quality, fermentation, post harvest handling, pest and diseases control		Using pesticides safely, the dangerous of pesticides use
6.	Information are shared into:				
	a. Don't know		0		0
	b. Leaflet		0		0
	c. Magazine		0		0
	d. Newspaper		0		0

e.	Visits and discuss with client	64.28	44.44
f.	Radio	0	0
g.	TV	0	0
h.	Training to farmer groups	35.71	66.67
i.	Training individually	92.85	33.33
j.	Other	0	0

The information and knowledge are mainly shared to farmers, farmer groups and cocoa buyer company. In Lampung, these information and knowledge were mainly shared when processors purchase cocoa from farmers. Meanwhile, in Central Sulawesi, the information and knowledge were mainly shared in the farmer group meeting. Both in Lampung and Central Sulawesi, the methods employed to share information was namely through visits and discussions with other processor/farmers, training to farmer groups and individual training.

In Lampung, the topics of cocoa beans quality, how to do fermentation, post harvest handling and pest control were shared more often, while in Central Sulawesi, the focal topics were safe use of chemical (pesticides) and the dangers of agro-chemicals.

v. Participants' awareness to new regulations related food safety

Table 24 shows that the level of awareness on food safety regulations increased post-TOF. In Lampung, the percentage of respondents who were aware of new regulations on food safety increased from 64.28% to 100%. Similarly, the percentage of more informed respondents in Central Sulawesi increased from 66.67% to 100%. It is envisaged that a shift in practice would follow.

Table 24. The awarness of agro-processors on the new regulation related to pesticide use

No.		Lampung		Central Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Aware of any regulations related food safety				
	a. Yes	64.28	100	66.67	100
	b. No	21.43	0	33.33	0

vi. Chemical application

There was evidence that the raised level of awareness brought about change in practice. As shown in Table 25, in Lampung, the percentage of agro-processors who applied chemicals directly to cocoa beans decreased from 7.14% to 0% post-TOF. There were no changes in the response from agro-processors in Central Sulawesi.

Table 25. The reason on using chemicals in cocoa farm

No.	Reasoning on using pesticide on cocoa farm	Lampung		Central Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Any chemicals applied directly to cocoa beans				
	a. Yes	7.14	0	11.11	11.11
	b. No	92.86	100	88.89	88.89
2.	Reasons chemicals are not applied				
	a. Not necessary	14.28	35.71	44.44	44.44
	b. Not available	0	0	22.22	0
	c. Too expensive	0	0	0	0
	d. Don't know how to use	28.57	7.14	22.22	0
	e. Too dangerous to use	7.14	64.28	0	33.33
	f. Other	7.14	0	0	0

Table 26 shows there is an improvement of chemicals use in the processors' level. In Central Sulawesi, before TOF, processors only wear rubber boots when apply chemicals but after TOF, processors not only wear rubber boot but also wear hat and gloves when apply chemicals. This indicates the awareness on safety standard was increased.

Table 26. Safety standard on using pesticide by processors

No.	Quesionary the safety standard on using pesticide	Lampung		Central Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	What clothing or equipment is worn for protection the the chemicals are applied				
	a. None	0	0	0	0
	b. Don't know	0	0	0	0
	c. Hat	0	0	0	11.11
	d. Gloves	0	0	0	11.11
	e. Rubber boots	0	0	11.11	11.11
	f. Overalls or over-trouserss	0	0	0	0
	g. Apron	0	0	0	0
	h. Coat	0	0	0	0
	i. Eye glasses/goggles	0	0	0	0
	j. Mask for nose and mouth	0	0	0	0
	k. Gas mask	0	0	0	0
	l. Other	0	0	0	0

vii. Sending cocoa beans for chemical analysis

Analyzing cocoa beans is rarely carried out by agro-processors, particularly for small-scale agro-processors. The impact assessment survey shows there was no change of chemical analysis in both regions. Table 27 shows in Lampung and Central Sulawesi, there were no one of agro- processors sent cocoa beans for chemical analysis, both before and after TOF. This reason was mainly due to the cost consideration.

Table 27. Sending cocoa beans for chemical analysis

No.	Quesionary on chemical analysis of cocoa bean before sending	Lampung		Central Sulawesi	
		Before TOF	After TOF	Before TOF	After TOF
1.	Have sent beans for chemical analysis related to food safety				
	a. Yes	0	0	0	0
	b. No	100	100	100	100
2.	Kind of analysis				
	a. Pesticides	0	0	0	0
	b. Toxin (myco,alpha-toxin)	0	0	0	0
	c. PAH/smoke	0	0	0	0
	d. Heavy metals (Pb, Cd)	0	0	0	0
3.	Where the beans sent				
	a. University	0	0	0	0
	b. Laboratory or research institution	0	0	0	0
	c. Private laboratory	0	0	0	0

Component II: Website / Knowledge exchange platform and awareness raising

5.2.7. Website and Knowledge Exchange Platform design, creation and content uploading

ICCRI has designed website to share the activities of the CocoaSafe project in Indonesia website. The url for the website is: http://www.cocoasafeindonesia.id/ and has information on SPS issues, TOF materials and image gallery. Users can download the materials free from the website.

Figure 54. The screenshot of the home page the CocoaSafe project in Indonesia. Url: http://www.cocoasafeindonesia.id/

5.2.8. Best practices and lessons learned from training activities shared via the knowledge exchange

a. Capacity building through CocoaSafe

This project has built a national CocoaSafe network starting from the National Steering Committe right down to the extension services in the cocoa producing locales. It is estimated that more than 500 persons in Indonesia has been trained leading to better and more informed SPS implementation related to cocoa. ICCRI as the national project implementing agency will continue to carry out training SPS issues through farmer training conducted by the ICCRI training Center (ICCRI-TC), which annually train more than 1000 persons from all over cocoa producing areas in Indonesia.

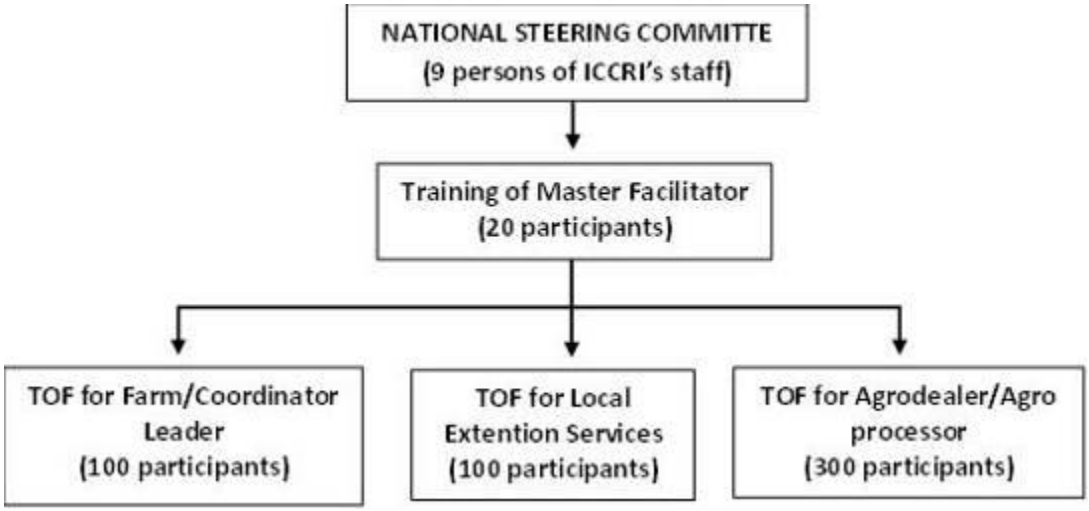

Figure 55. Flow schart in the developing human resources on cocoa safe in Indonesia

b. International network of cocoa stakeholders

An international networking of cocoa stakeholders was also established between national cocoa agencies and private sectors.

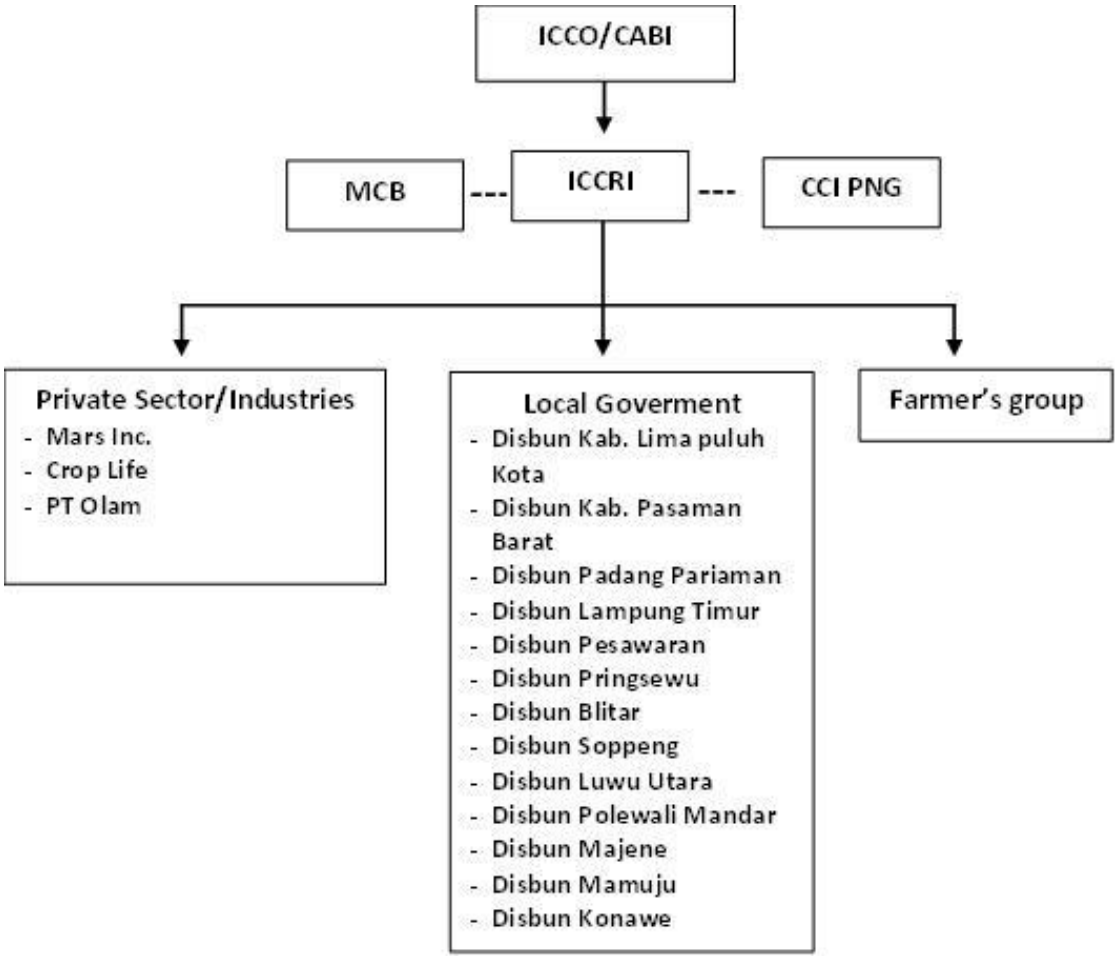

Figure 56. An international network between cocoa stakeholders

5.2.9. Production of printed materials for dissemination at key points in the supply chain 97

a. Posters on how to use pesticide properly and safely

Two posters to on how to use pesticide properly and safely was created and printed for knowledge sharing. The posters were distributed through the TOF participants.

Figure 57. The posters as part of the campaign for safe pesticide use.

b. Training manual

Locally adapted training manuals were published. Topics ranged from control of pest and diseases, planting materials, post harvest handling, fertilizer application, drying and storage. The training manuals were printed in poster size and distributed to TOF participants. The idea behind the poster-size is that the modules can be hung out on the wall for ease of reference.

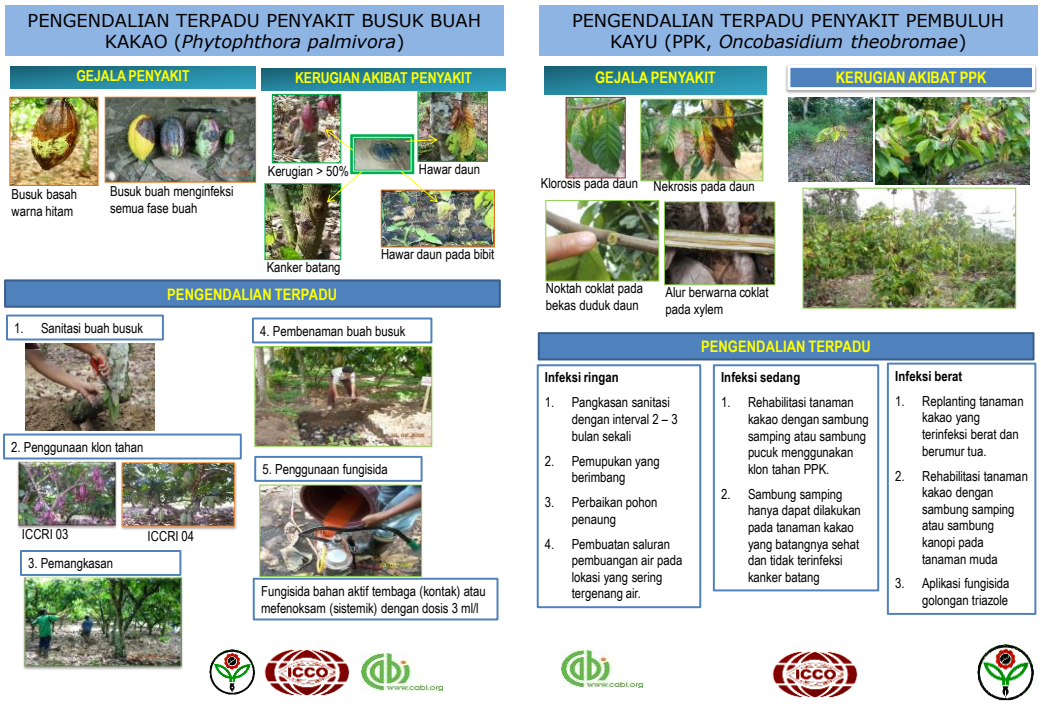

Figure 58. Excerpts from the training manual: Modules on pest and diseases control

Figure 59. Excerpts from the training manual: Modules on post-harvest handling

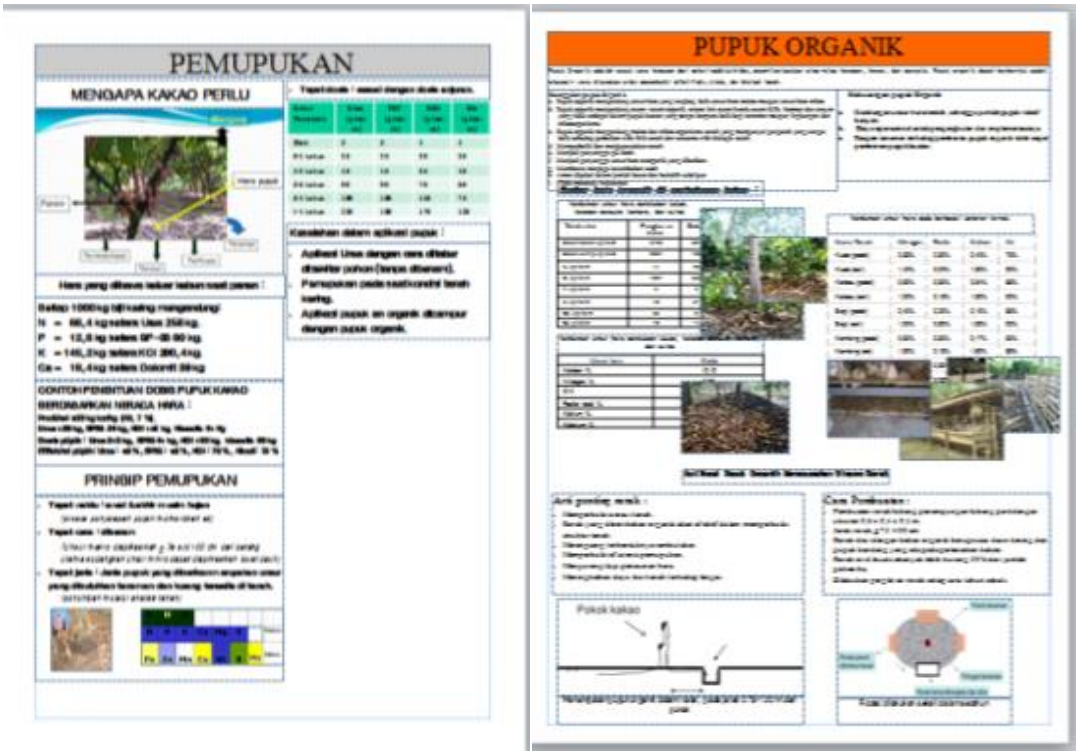

Figure 60. Excerpts from the training manual: Modules on fertilizer application

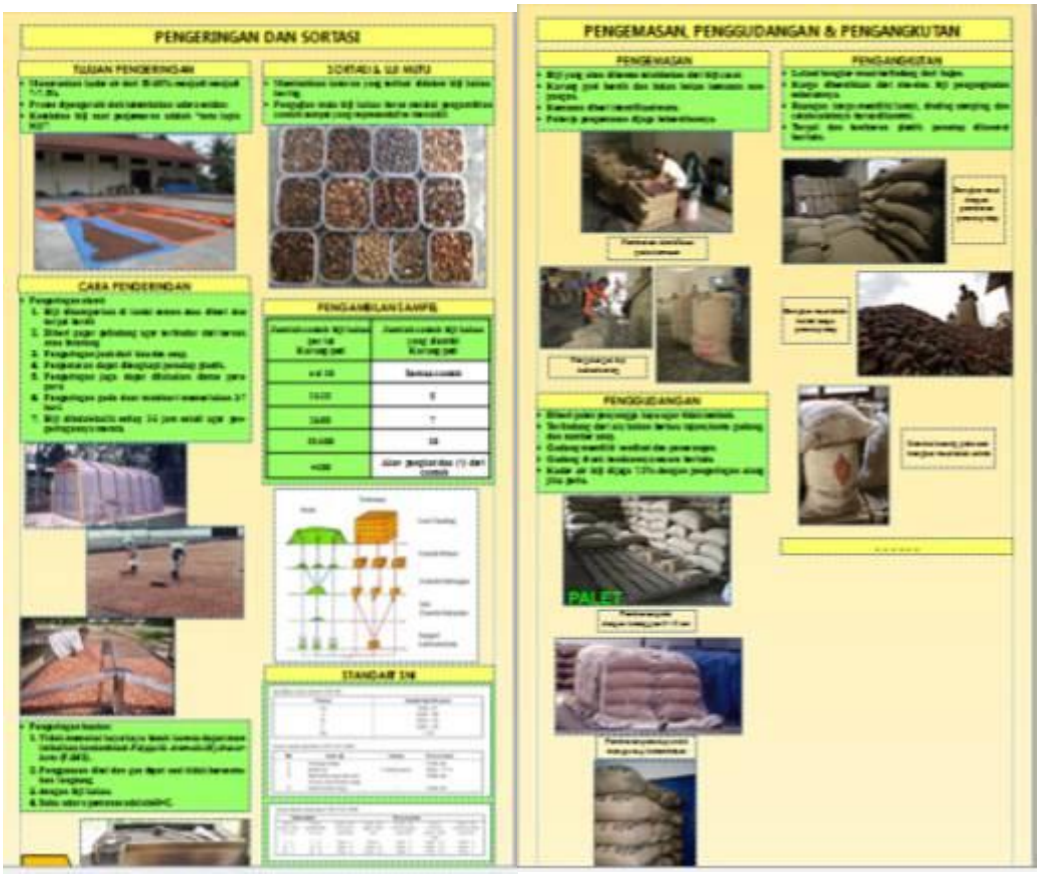

Figure 61. Excerpts from the training manual: Modules on drying and storage

Figure 62. Excerpts from the training manual: Modules on planting material

5.2.10. Production of multimedia videos for distribution and online

A 5-minute video on how to use pesticide properly and safely was produced. The video was sceened during the TOF sessions so that participants could gain better understanding on the pesticide use module.


Figure 63. Screen grab of the video

6. FINANCIAL OVERVIEW

ICCRI was allocated a budget of USD 205,065.00 from STDF. ICCRI and other partners agreed to contribute in-cash and in-kind in the amount of USD 85,9430.00. ICCRI received USD 170,750.00 from CABI up to March 2016. The total expenditure up to project completion in March 2016 is USD 184,855.00 (STDF allocation). Mmeanwhile, the total in-kind and in-cash contribution is USD 43,960. The detailed financial report is given in Annex 10.1.

Table 28. Financial overview of the budget used at ICCRI

Items	STDF	In kind / Other	Total
Total project budget (US$)	205.065	85.943	291.008
Total amount received to date (US$)	170.750	85.943	256.693
Total expenditure during the reporting period*	184.855	43.960	228.815
Total expenditure to date (US$)	184.855	43.960	228.815
Unspent funds (US$)	(14.105)	41.983	27.878

7. OVERALL PROJECT RESULTS AND LESSONS LEARNED

Overall project results

Overall results of the projects can be summarized as followed;

- The trainings have provided capacity building to more than 500 persons on issues such as SPS, food afety standards, GAP and post-harvest handling that would contribute to the improvement of Indonesian cocoa quality, particularly for export.
- The locally adapted curricula on SPS and food safety standards will be integrated into the ICCRI-TC program on GAP and processing. The training method wil also be used in the farmer field school (FFS) trainings.
- The national CocoaSafe project is a public domain website from which visitors can access into the information, resources and training manual.
- Impact assessment survey provided indications of improved agricultural practices and knowledge on pesticide use.

The project has benefited many cocoa stakeholders included researchers, cocoa farmers, agro-dealers, processor, industry, local government at the district level and the extention services.

Cocoa researcher: CocoaSafe project has trained junior cocoa researchers of ICCRI as master facilitators. As MFs, they are expected to implement future training on cocoa safety and update modules as and when necessary (e.g. introduction of new technology/regulations/etc).

Cocoa farmers: Trained farmers obtained better knowledge and understanding on the implementation of agricultural practices related to SPS issue. In parallel with the improving cocoa productivity and quality the farmers have also been aware on food safety standards. The project has also provided farmers with farmer-friendly resources (e.g. poster size training manuals) as guidance and as information dissemination tools.

Agro-dealers: TOF for agro-dealers has improved awareness on food safety standard, SPS and new regulation concerning agro-chemicals.

Processors: TOF participants increased their knowledge on cocoa drying and storing. Drying and storing are both critical steps on post harvest handling that have to be handled properly to meet safety standards on cocoa.

Extension officers: The government officers at the district level play crucial role in enforcing local regulations on cocoa trading. After the training, the officers improved their understanding on SPS, which would be used to guide the formulation of local regulations and extension services.

Lesson Learned :

Components & Activities	Problem/Success	Impact	Recommendation
Component 1: Enhanced Capacity of Stakeholders to Improve Quality of Cocoa and meet SPS Standards			
Activity 1.1. Development the locally adapted curricula for training of trainers.	- Curricula for TOMF and TOF was locally adapted and fit for use to carry out trainings ISBN number is 978-979-8745-23-2	- Training manual on CocoaSafe in Indonesia available. - Improved training curricula at the ICCRI Training Center (ICCRI-TC)	- CocoaSafe curricula will be used as part of the training curricula on cocoa cultivation at ICCRI-TC.
Activity 1.2. Train agricultural officers (research and extension staff) as master trainer.	- 20 participants were trained during the TOMF. Some of the TOMF participants were ICCRI's researchers and local extension staff.	- MF of researchers play significant role on implementing the TOF sessions.	- Trained a core group of MFs as part of extension under CocoaSafe
Activity 1.3. Training of facilitators: farm group/cooperative leaders.	- Farm group leader from some producing area (South Sulawesi, SE Sulawesi, West Sulawesi, West Sumatra and East Java) were trained on SPS. - The participants were too few to represent the whole population of cocoa farmers in Indonesia, where the area cover more than 1.7 million Ha.	- A core group of farmers trained on SPS topics, who can then be the outreach to other farmers through various communicating methods e.g. FFS.	- Follow up with farmer field school (FFS) on SPS by FS of farm leaders. - Increasing the number of TOF for farmer leaders.
Activity 1.4. Training of facilitators: Local extension staff.	- Local extension from some producing area (South Sulawesi, SE Sulawesi, West Sulawesi, West Sumatra and East Java) were trained on SPS - The participants of local extension were not specialized in cocoa extension service.	- A core group of extension officers trained to act as outreach.	- Increase the skill of local extension on cocoa farming. - Increasing the number of TOF for local extension

Activity 1.5. Training of facilitators: Agro-dealers.	- TOF for agro-dealers were a bit more difficult than TOF for farm leader as the dealers have difficulty in allocating time to participate in the trainings. - TOF for agro-dealers were conducted in the areas of higher pesticide consumption e.g. West Sulawesi.	- Agro-dealers will manage the selling of pesticide according to the Government regulation.	- Government should increase awareness amongst agro-dealers to sell only authentic and regulated list of pesticides.
Activity 1.6. Training of facilitators: Storage/Processing.	- TOF for storage/processing was carried out with the aim to improve storage and processing practices.	- Processor will understand best storage conditions for cocoa bean to improve quality of cocoa.	- SPS standard on cocoa safe should be synchronized with the decree of Ministry of Agriculture #67/2013 in cocoa quality.
Activity 1.7. Training in best practices postharvest: Traders and Processors.	- Training in best practices postharvest carried out in parallel with TOF for processors. The participants were farmer groups, who also manages postharvest handling of beans	- Improve understanding on proper postharvest handling methods to increase competitiveness of cocoa bean in international market .	- Cocoa processing by farmers to be carried out in UPH (unit processing of harvested beans) to make ensure that safety standards (incl. those of SNI) are met.
Activity 1.8. Baseline and Impact surveys	- Baseline and impact surveys carried out to evaluae efficacy of training programs.	- Improvement of project activities and development of specific tools or curricula to catered to target groups.	- Data of farmer's characteristics can be used as the basic information to develop human resources related on cocoa commodity. - Develop more dissemination tools such as posters to expand information to wider audience.

Component 2: Website/ Knowledge Exchange Platform and Awareness Raising			
Activity 2.1. Analysis of website user accessibility/requirement			
Activity 2.2. Design, creation of website/knowledge exchange platform.	- Website to share cocoa safe project designed and can be assessed by all cocoa stakeholders.	- Accelerate transfer of information to farmers and extension.	- Update website with new information related to cocoa safety.
Activity 2.3. Updating, maintenance and monitoring of website/ knowledge exchange platform.			
Activity 2.4. Best practices and lesson learned from training activities shared via the knowledge platform.	- The adopted training curricula used as national standard on cocoa safety.	- Updating the standard of training manual on SPS .	- Use the curricula as the benchmark on training modules on cocoa safety
Activity 2.5. Production of printed materials for dissemination.	- The printed materials such as training manuals both for TOMF and TOF and posters were printed and distributed to the participants and other stakeholders.	- Used traditional print media to disseminate information on cocosa safety to stakeholders.	- The master copy can used to produce more copies for future training activities.
Activity 2.6. Production of multimedia videos for distribution and online.	- Multimedia video on how to use pesticide properly produced.	- Assist farmers in improving pesticide use using visual teaching method..	- Distribute multimedia via online and make more copies for farmers.
Activity 2.7. Awareness raising in PNG through website and availability/ distribution of publicity materials, need assessment study in PNG.			
Component 3: Coordination, Management and Evaluation of the Project.			

Activity 3.1. Project Coordination	- Project coordination was carried out between NSC and partners.	- Improved understanding among project implementors.	- Integrate lessons learnt from project management to improve future project implementation.
Activity 3.1. Project Inception Workshop/Meeting	- Project inception meeting were conducted two times to evaluate the progress of project implementation.	- Project direction was given the affirmation that it was meeting project goals.	- Project results to be used to improve project implementation.
Activity 3.1. End Project Workshop/ Meeting	- Final project meeting to review the project results.	- Benchmarking the project success.	- Final report as the milestone of the project success.

8. RECOMMENDATIONS

9.1. Specific recommendations to the project

- The locally-adapted training syllabus was used as training manuals for CocoaSafe in Indonesia, and sections to be integrated with the training curricula of ICCRI training center (ICCRI-TC) in term of SPS standards.
- Further training of facilitators should be expanded to other cocoa growing areas.
- TOF for farmer's group have increased farmers' knowledge on Good Agricultural Practice (GAP) in the cocoa production system especially in the application of fertilizer, weeding and pest and diseases control. The trained farmers also have improving processing practices e.g. drying of harvested beans using more hygienic and safe methods .**TOF for farmer's leader and local extensions were more effective on increasing the quality of cocoa production system.**
- TOF for agro-dealers have improved knowledge on pesticides and the number of farmers keeping record on pesticides use. **Better knowledge on pesticides use will reduce the pesticide residue**.
- TOF for agro-processors improved storage methods and conditions. Agro-processors who attended the TOF were also more mindful about storing beans with other strong smelling commodities, and the application of chemicals directly onto beans.
- There was increased knowledge and information related to food safety and pesticides use in farmers, agro-dealers and agro-processors. More respondents reported use of protective equipment and clothes during application of agro-chemcials.
- More trainings to be conducted to expand the circle of informed stakeholders in the cocoa supply chain.

9.2. Broader recommendations

- Number of cocoa farmer in Indonesia >1.5 million. Only 500 farmers participated in the trainings. Future trainings to include more participants.
- Area covered by this project about 500 ha, still less than 1.7 million ha.
- Limited coverage of locations. TOFs were only carried out in 7 provinces covering about 14 districts (less than the 350 districts of cocoa growing area in Indonesia).

9. ANNEXES

10.1. Financial Report

No.	Items	Unit	QTY	Unit cost (USD)	STDF	In cash by ICCRI	External Cofinancing	In Kind by ICCRI
COMPONENT 1								
Activity 1.1.	***Development of locally-adapted curiculla and training materials***							
	- Translation and editing	Book	1	217	217			
	- Printing manual book	Copy	25	12	300			
Activity 1.2.	***Training of Master Facilitator (TOMF)***							
	a. Venue and other logistics							
	- Meeting room							
	- LCD projector							
	- Supporting staff							
	- etc						-	3675
	b. Materials for demonstration							
	- Demplot on GAP	Ha	1	1.913		1.913		
	- Nursery on clonal propagation	Package	1	545		545		
	- Post harvest handling & fermentation	Package	1	1.304		1.304		
	- Pesticide application	Package	1	261		261		
	- Pest & disease assessment	Package	1	248		248		
	- Fertilizer identification	Package	1	345		345		
	- Local transport	Car	12	52.08		625		
	c. Travel for trainee							
	- Airfare ticket	trip	15		2.668			
	- Local transport	trip	15		1.342			
	- Car for field trip	trip	3		565			
	d. DSA for trainee	day	240	100	24.000			
Acitivity 1.3.	***TOF for farmer's group/cooperative leaders & local extention (10 TOF)***							
	a. TOF in West Sumatra							
	- Travel for master facilitator							
	2 MF from ICCRI	Trip	2	350,0	700			
	1 local MF	Trip	1	100,0	100			
	- Staff time for master facilitator (3 MF)	Day	24	200,0	4.800			
	- DSA for master facilitator (3 MF)	Day	24	100,0	2.400			
	- Travel for participants to TOF	Trip	120	13,0	1.565			
	- DSA for participants to TOF	Day	120	12,6	1.513			
	b. TOF in South Sulawesi							
	- Travel for master facilitator							
	2 MF from ICCRI	Trip	2	350,0	700			
	2 local MF	Trip	2	100,0	200			
	- Staff time for master facilitator (4 MF)	Day	32	200,0	6.400			
	- DSA for master facilitator (4 MF)	Day	32	100,0	3.200			
	- Travel for participants to TOF	Trip	120	13,0	1.565			
	- DSA for participants to TOF	Day	120	12,6	1.513			
	- Staff time for industry expert	Day	3	200			600	
	- Travel for industry to TOF	Flight	1	500			500	
	- DSA for industry expert to TOF	Day	3	120			360	
	c. TOF in Southeast Sulawesi							
	- Travel for master facilitator							
	2 MF from ICCRI	Trip	2	350,0	700			
	1 local MF	Trip	1	50,0	50			

No.	Items	Unit	QTY	Unit cost (USD)	STDF	In cash by ICCRI	External Cofinancing	In Kind by ICCRI
	- Staff time for master facilitator (3 MF)	Day	24	200,0	4.800			
	- DSA for master facilitator (3 MF)	Day	24	100,0	2.400			
	- Travel for participants to TOF	Trip	120	13,0	1.565			
	- DSA for participants to TOF	Day	120	12,6	1.513			
	d. TOF in West Sulawesi							
	- Travel for master facilitator							
	2 MF from ICCRI	Trip	2	350,0	700			
	1 local MF	Trip	1	100,0	100			
	- Staff time for master facilitator (3 MF)	Day	24	200,0	4.800			
	- DSA for master facilitator (3 MF)	Day	24	100,0	2.400			
	- Travel for participants to TOF	Trip	120	13,0	1.565			
	- DSA for participants to TOF	Day	120	12,6	1.513			
	e. TOF in East Java							
	- Travel for master facilitator							
	1 local MF	Trip	1	100,0	100			
	- Local transport (rent 2 car)	Day	12	82,0	984			
	- Staff time for master facilitator (4 MF)	Day	32	200,0	6.400			
	- DSA for master facilitator (4 MF)	Day	32	100,0	3.200			
	- Travel for participants to TOF	Trip	120	13,0	1.565			
	- DSA for participants to TOF	Day	120	12,6	1.513			
	f. Venue and other logistics							
	- Meeting room	Room	30	82		2.459	7.876	
	- LCD projector	Unit	10	61		615		
	g. Materials for demonstration							
	- Training materials	Lumpsum	210	15,4	3.234			
	- Translation of training materials	Day	3	500	1.500	4.734		
Activity 1.5.	***TOF for Agro Dealer (2 TOF)***							
	a. TOF in West Sumatra							
	- Travel for master facilitator (2 MF)	Trip	2	300	600			
	- Staff time for master facilitator (2 MF)	Day	12	200,0	2.400			
	- DSA for master facilitator (2 MF)	Day	12	100,0	1.200			
	- Travel for participants (20 persons in 3 locations)	Trip	60	13,0	783			
	- DSA for participants (20 persons, 3 days)	Day	60	12,6	757			
	- Staff time for industry expert	Day	7	200			1.400	
	- Travel for industry to TOF	Flight	1	500			500	
	- DSA for industry expert to TOF	Day	7	120			840	
	b. TOF in West Sulawesi							
	- Travel for master facilitator (2 MF)	Trip	2	300	600			
	- Staff time for master facilitator (2 MF)	Day	16	200,0	3.200			
	- DSA for master facilitator (2 MF)	Day	16	100,0	1.600			
	- Travel for participants (20 persons in 3 locations)	Trip	60	13,0	783			
	- DSA for participants (20 persons, 3 days)	Day	60	12,6	757			

No.	Items	Unit	QTY	Unit cost (USD)	STDF	In cash by ICCRI	External Cofinancing	In Kind by ICCRI
Activity 1.6.	***TOF for Processor/Trader (3 TOF)***							
	a. TOF in Lampung							
	- Travel for master facilitator (2 MF)	Trip	2	300	600			
	- Staff time for master facilitator (2 MF)	Day	14	200,0	2.800			
	- DSA for master facilitator (2 MF)	Day	14	100,0	1.400			
	- Travel for participants (20 persons in 3 locations)	Trip	60	13,0	783			
	- DSA for participants (20 persons, 3 days)	Day	60	12,6	757			
	- Staff time for industry expert	Day	7	200			1.400	
	- Travel for industry to TOF	Flight	1	500			500	
	- DSA for industry expert to TOF	Day	7	120			840	
	b. TOF in Central Sulawesi							
	- Travel for master facilitator (2 MF)	Trip	2	300	600			
	- Staff time for master facilitator (2 MF)	Day	12	200,0	2.400			
	- DSA for master facilitator (2 MF)	Day	12	100,0	1.200			
	- Travel for participants (20 persons in 3 locations)	Trip	60	13,0	783			
	- DSA for participants (20 persons, 3 days)	Day	60	12,6	757			
	c. TOF in South Sulawesi							
	- Travel for master facilitator (2 MF)	Trip	2	300	600			
	- Staff time for master facilitator (2 MF)	Day	12	200,0	2.400			
	- DSA for master facilitator (2 MF)	Day	12	100,0	1.200			
	- Travel for participants (20 persons in 3 locations)	Trip	60	13,0	783			
	- DSA for participants (20 persons, 3 days)	Day	60	12,6	757			
	d. Venue and other logistics							
	- Meeting room and other logitics	Room	15	100	1.500	1.500		
	e. Materials for demonstration							
	- Training materials	Lumpsum	105	10,0	1.050			
Activity 1.8	***Project impact survey***							
	Travel	Trip						
	- Southeast Sulawesi		1	630	630			
	- South Sulawesi		1	556	556			
	- Central Sulawesi		1	555	555			
	- East Java		1	252	252			
	- West Sumatra		1	467	467			
	- Lampung		1	481	481			
	DSA	Day	58	100	5.800			
	Material	Material	400	3	1.200			
	Staff time	Day	58	200	11.600			3.360
Total Component 1					**148.938**	**14.549**	**14.816**	**7.035**
COMPONENT 2								
Activity 2.5.	***Production of printed material in Bahasa Indonesia for dissemination***							
	a. Design and production of dissemination material (2 posters on rational use of pesticide)	Copy	200	18	3.600			
	b. Production TOF manual in Bahasa Indonesia	Lumpsum	7	500	3.500			
	c. Production of dissemination materials (TOMF Manuals)	Copy	500	5,9	2.950			
Activity 2.6.	***Production of multimedia videos and website for distribution and online***							
	a. Design and production video on rational use of pesticide	Lumpsum	1	1.000	1.000			

No.	Items	Unit	QTY	Unit cost (USD)	STDF	In cash by ICCRI	External Cofinancing	In Kind by ICCRI
	b. Design website on cocoasafe in Indonesian version	Lumpsum	1	1.250	1.250			
Total Component 2					**12.300**	**-**	**-**	**-**
COMPONENT 3								
Activity 3.1								
Act. 3.1.	Project coordination							
	Communication	Lumpsum	2	500	1.000			
	National manager	Day	60	200	12.000			5.040
	National support staff	Day	30	200	6.000			2.520
Act. 3.2.	Project inception meeting							
	Flight to KL for Dr. Soetanto	trip	1	427	427			
	Day	Day	4	150	600			
Act. 3.3.	End Project Meeting							
	Flight to KK for Dr. Soetanto and Dr. Agung Susilo	trip	2	895	1.790			
	Day	Day	12	150	1.800			
Total Component 3					**23.617**	**-**	**-**	**7.560**
TOTAL REALIZED BUDGET					**184.855**	**14.549**	**14.816**	**14.595**

10.2. Contact List

A. The list participanct of TOF for Farmer's Leader

No.	Name	Gender	Age	Address
I.	**Lima Puluh Kota District, West Sumatra**			
1.	A. DT Lelo Batuah	M	36	Situjuh Gadang kec. Situjuh
2.	Agusman	M	34	Gurun Kec. Harau
3.	Aidil Fitri	M	34	Padang mungka, Kec. Mungka
4.	Andi	M	36	Kuranji Kec. Guguk
5.	Aziz Roesihan	M	54	Talago, Tujuh Koto Kec. Guguk
6.	Dasril Arial	M	39	Kec. Gunung Omeh
7.	Erwan Misben	M	49	Tiakar, Nagari Guguk 8 Koto Kec. Guguk
8.	Fatimah Yurnita	F	47	Belubus Sungai Talang, Kec. Guguk
9.	Harmon Alia	F	46	Sungai Balantiah Kec. Akabiluru
10.	Irwan	M	31	Kec. Harau
11.	Khairul Andri	M	39	Koto Kaciak, Tujuh Koto Kec. Guguk
12.	Melfa	F	47	Sungai Talang, Kec. Guguk
13.	Mulyadi Dal	M	57	Guguk 8 Koto Kec. Guguk
14.	R. DT. Patiah S.	M	61	Bukit Apit Sungai Talang Kec. Guguk
15.	Rifki Sunardi	M	33	Belubus Sungai Talang, Kec. Guguk
16.	Syahrial Ibrahim	M	48	Taeh Kec. Payakumbuh
17.	Sumardi	M	51	Belubus Sungai Talang, Kec. Guguk
18.	Tesa Difrianda	F	28	Kec. Harau
19.	Z. DT. Bagindo Sati	M	40	Bukit Apit sungai Tala ng
20.	Zahremi	M	47	Batu Hampar Kec. Akabiluru
II.	**South Konawe District, Southeast Sulawesi**			
1.	Agung Ayu Arini	F	39	Uelawa, Benua
2.	Amir Tangke	M	65	Polopololi, Basala
3.	Andi Elli	M	22	Uelawa, Benua
4.	Andi Syahrul	M	40	Uelawa, Benua
5.	Ashadi Cahyadi, SP	M	43	Patoro, Puunggaluku
6.	Asis	M	29	Polopololi, Basala
7.	Here Wangi	F	34	Uelawa, Benua
8.	I Gusti Kade Yasa	M	35	Puunggawu Kawu, Benua
9.	Jasiran	M	38	Puunggawu Kawu, Benua
10.	Karwoto	M	32	Uelawa, Benua
11.	Mansyur Syah	M	35	Uelawa, Benua
12.	Musradil	M	69	Powewu, Benua
13.	Sarman	M	30	Puunggawu Kawu, Benua
14.	Sirajuddin	M	40	Powewu, Benua
15.	Sugiman	M	34	Puunggawu Kawu, Benua
16.	Suherman	M	39	Powewu, Benua
17.	Sukardi	M	46	Uelawa, Benua
18.	Suriaman	M	23	Polopololi, Basala
19.	Suyatno	M	41	Puunggawu Kawu, Benua
20.	Syarifuddin	M	34	Puunggawu Kawu, Benua
III.	**Polewali Mandar District, West Sulawesi**			
1.	Abd. Rahman	M	NA	Dsn. Bululawang, Ds. Patampanua, Kab. Polewali Mandar (Polman)
2.	Ansi	M	46	Ds. Bate Tangnga, Kab. Polewali Mandar
3.	Arifin	M	49	Ds. Duampanua, Kec. Anreapi
4.	Bakri	M	39	Tondo Ratte, Ds. Landi Kanusuang, Kec. Mapilli
5.	Firman Amin, S.IP	M	41	Padangmawalle, Kel. Taramanu, Kec. Tutar
6.	H. Burhanuddin R	M	43	Dsn. Pulluddung, Ds. Landi Kanusuang
7.	Haerus	M	41	Ds. Mirring, Kec. Binuang
8.	Halipuddin	M	38	Tondo Ratte, Ds. Landi Kanusuang
9.	Hayadil	M	45	Pariangan, Ds. Pussui, Kec. Loyo
10.	Jamaluddin	M	47	Kanang, Ds. Batetangnga, Kec. Binuang,
11.	Jumasri	M	42	Ds. Rappang

12.	Kamaluddin	M	41	Kel. Batu Panga, Lingkungan Kalimbua Barat, Kec. Loyo
13.	Muhsin	M	47	London, Ds. Peburru, Kec. Tutar
14.	Muslimaulana M	M	21	Lewukang, Ds. Tandassura, Kec. Limboro
15.	Ramadan	M	44	Salutengnge
16.	Rustam Bakka	M	43	Lemo Baru, Ds. Kuajang, Kec. Binuang,
17.	Saparuddin	M	34	Tapango Barat
18.	Sirajuddin	M	56	Ds. Rappang
19.	Sunarya	M	NA	Mapilli, Polewali Mandar
20.	Yudin	M	46	Ds. Lagi-Agi, Kec. Campalagian
IV.	**Soppeng District, South Sulawesi**			
1.	A Yusman	M	40	Ds. Citta, Kec. Citta Soppeng
2.	Abidin	M	NA	Parenring, Kec. Lilirilau Soppeng
3.	Adi Purwirawan	M	21	Banyuurip, Kec. Bone-Bone Luwu Utara
4.	Agus Riyanto	M	NA	Coppeng-Coppeng, Ds. Soga, Kec. Marioriwawo Soppeng
5.	Alimuddin Kale	M	44	Noling, Kec. Bupon, Luwu
6.	Amiruddin	M	65	Takalala, Kec. Marioriwawo, Soppeng
7.	Buhe	M	NA	Peppae, Ds. Abbanuange, Soppeng
8.	Drs. H. Abd Rahman Masse	M	45	Ds. Panincong, Kab. Soppeng
9.	Drs. Sehang	M	47	Ds. Tetewatu, Kec. Lilirilau, Soppeng
10.	H. Amir	M	55	Jekkae, Ds. Tinco, Soppeng
11.	Jamaluddin	M	44	Ungae, Ds. Citta, Kec. Citta Soppeng
12.	Jannong	M	51	Ds. Panincong, Soppeng
13.	Muh Nasir	M	45	Baringeng, Kec. Lilirilau Soppeng
14.	Mustafah	M	32	Kamp. Masiji/Kamp. Baru, Ds. Baringeng Soppeng
15.	Naharuddin	M	45	Maccope, Ds. Maridrilau Soppeng
16.	Samsuddin	M	35	Kel. Cabenge, Lingkungan Talepu, Kampung Cakke Soppeng
17.	Sarifuddin	M	42	Jekkae, Ds. Tinco Soppeng
18.	Sudirman	M	50	Data, Ds. Labae Soppeng
19.	Suharwan, S.IP	M	40	Pajalesang (Marioriwawo), Ds. Barae, Soppeng
20.	Sultamin	M	43	Batue, Ds. Masing Soppeng
V.	**Blitar District, East Java**			
1.	Abunyamin	M	55	Jimbe, Kab. Blitar
2.	Eko Santoso	M	47	Ds. Plosorejo, Kec. Kademangan
3.	H. Jaelani	M	64	Ds. Plosorejo, Kec. Kademangan
4.	Jamaludin	M	43	Ds. Plosorejo, Kec. Kademangan
5.	Kasiman	M	62	Sidomulyo, Bakung
6.	M Iqbalud Daroini	M	22	Ds. Plosorejo, Kec. Kademangan
7.	Mahmudi	M	53	Ds. Suruhwadang RT.01 RW.01
8.	Marsaid	M	40	Dawuhan, Kab. Blitar
9.	Mintartik	F	43	Ds. Bululawang RT.01 RW.02, Kec. Bakung
10.	Paidjo	M	66	Dawuhan, Blitar
11.	Parnoto	M	73	Darungan, Blitar
12.	Purwanti	F	45	Ds. Modangan RT.02 RW.13, Kec. Nglegok Blitar
13.	Rokaini	F	72	Jimbe, Blitar
14.	Sugimin	M	NA	Ds. Plosorejo, Kec. Kademangan
15.	Suharman	M	54	Ds. Modangan RT.01 RW.13, Kec. Nglegok Blitar
16.	Sumiatun	F	53	Sidomulyo, Bakung Blitar
17.	Sunardi	M	64	Dsn. Karang Anyar, Ds. Modangan, Kec. Nglegok, Blitar
18.	Sunoto	M	60	Ds. Bululawang, Kec. Bakung, Blitar

19.	Suparno	M	43	Dsn. Karang Anyar Ds. Modangan RT.01 RW.15, Kec. Nglegok, Blitar
20.	Suwarno	M	45	Ds. Plosorejo RT.3 RW.2, Kec. Kademangan, Blitar

B. The list participanct of TOF for Local Extension

No.	Name	Gender	Age	Address
I.	**Lima Puluh Kota District, West Sumatra**			
1.	Adrizal	M	53	Distanhorbun kab. 50 Kota
2.	Afri Yundewal	M	52	Distanhorbun kab. 50 Kota
3.	Amrizal S	M	54	Distanhorbun kab. 50 Kota
4.	Amrizal Sy, SP	M	54	Distanhorbun kab. 50 Kota
5.	Elzarefni	F	51	Distanhorbun kab. 50 Kota
6.	Fauzi	M	49	Distanhorbun kab. 50 Kota
7.	Jonaidi	M	48	Distanhorbun kab. 50 Kota
8.	Liza Heryoni	F	33	Distanhorbun kab. 50 Kota
9.	Nasrul	M	37	Distanhorbun kab. 50 Kota
10.	Nurjasmi Saan	M	48	Distanhorbun kab. 50 Kota
11.	Ramudin M, S.ST	M	48	Distanhorbun kab. 50 Kota
12.	Rifnaldi	M	47	Distanhorbun kab. 50 Kota
13.	Sumini	F	53	Distanhorbun kab. 50 Kota
14.	Syafri S	M	54	Distanhorbun kab. 50 Kota
15.	Syafrida	F	47	Distanhorbun kab. 50 Kota
16.	Syahrial Syukur	M	54	Distanhorbun kab. 50 Kota
17.	Syamsurijat	M	53	Distanhorbun kab. 50 Kota
18.	Yas Eni Zarti	F	53	Distanhorbun kab. 50 Kota
19.	Yusmayeti, A.Md	F	50	Sungai Geringging
20.	Zulkailisman, S.Pt, M.Si	M	51	Sungai Geringging
II.	**South Konawe District, Southeast Sulawesi**			
1.	Agustianus, STP	M	43	Puunaha, Unaaha
2.	Arif Budi Setiawan, S.Sos	M	29	Matahoalu, Uepai
3.	Bambang Suwandi	M	61	Panggulawu, Uepal
4.	Dedi Akri Munandar, S.Si	M	31	Tawaro Tebota, Uepai
5.	Habri, SP	M	42	Laosu, Sampara
6.	Hendra Gunawan	M	45	Kota Kendari
7.	I Gede Yoga Arimbawa	M	35	Olo Oloho, Uepai
8.	I Nyoman Mei Hartolegawo, SP	M	28	Ola Oloho, Uepai
9.	Khoirul Amin	M	58	Wowasolo, Wonggeduku
10.	Mulyadi, SP	M	41	Arombu, Unaaha
11.	Murat	M	46	Amberi, Lambuya
12.	Rusdi, SP	M	40	Asinua, Unaaha
13.	Salim	M	35	Meluhu, Meluhu
14.	Sudirman	M	39	Wowasolo, Wonggeduku
15.	Syairman	M	37	Besulutu, Besulutu
16.	Verky Malaya, SP	M	31	Umboto, Uepai
17.	Wahyu Nanang Satya, SP	M	30	Ameroro, Uepai
18.	Wahyu Rahmadani, SP	F	33	Umboto, Uepai
19.	Wahyudi	M	30	Wowasolo, Wonggeduku
20.	Yulius Bari	M	43	Kota Kendari
III.	**Polewali Mandar District, West Sulawesi**			
1.	Abdul Aziz J. S.IP	M	48	Kel. Darma, Kab. Polewali Mandar
2.	Abdul Kadir, SP, M.Si	M	47	Banatorejo, Tapango
3.	Abdullah	M	51	Mapilli Barat
4.	Alex Wongkar, SP	M	51	Kec. Wonomulyo
5.	Burhanuddin Muin, SP	M	28	Tandassura, Kec. Limboro
6.	Burhanuddin, SP	M	50	Darma, Jl. Gatot Subroto, Polman
7.	Edi Kadir	M	33	Kanang, Polman
8.	Harianto S.IP	M	40	Jl. Pameran, Kel. Darma, Polman
9.	Ika Rahmatika, SP	F	26	Jl. Serigala No.91, Manding, Polman

10.	Jamaluddin, SP	M	43	Jl. Poros Majene, Ds. Darappe, Kec. Campalagian, Polman
11.	Kasno Sudiarto, SP	M	49	Kec. Campalagian, Kab. Polewali Polman
12.	Mahayuddin, SP	M	33	Jl. Kiri-Kiri, Polewali Mandar
13.	Muh. Randy Yudiansyah, SP	M	29	BTN Pole Indah Mas Blok KK No.2, Polewali Mandar
14.	Muh. Thamrin, SP	M	51	Jl. Ahmad Yani No.53, Polman
15.	Nirmawati, SP	F	31	Jl. Mangundang, Polman
16.	Raoda, SP	F	49	Kel. Darma, Polman
17.	Safri, SP	M	28	Pappandangan, Polman
18.	Subaer, SP	M	51	Kel. Sidodadi, Kec. Wonomulyo, Polman
19.	Sukriani	M	33	Reatimur, Polman
20.	Syahruddin, SP	M	47	Jl. Melati No.2, Polman
21.	Muh Tahir	M	42	Rea Barat, Patampanua, Polman
22.	Muh Syarif	M	52	Jl. Poros Majene, Rea Barat, Polman
23.	Abd Salam	M	52	Jl. Cendrawasih, Polewali Mandar
24.	Bakrun	M	45	Jl. Poros Basseang, Polewali Mandar
IV.	**Soppeng District, South Sulawesi**			
1.	A Yuliati, SP	F	33	Jl. Komp. Pasar Sentral Watansoppeng
2.	Abdul Azis	M	47	Ds. Paroto, Kec. Lilirilau
3.	Andi Welinasga, A.Md. Kom	M	27	Turungeng Lappae, Ds. Tottong
4.	Arifin	M	45	Kawarang, Ds. Patampanua, Kec. Marioriawa
5.	Azis, S.ST	M	NA	Malaka Raya, Kab. Soppeng
6.	Ir. Baharuddin	M	46	Kalempang, Kab. Soppeng
7.	Fatmawati, SP	F	45	Tengapadange, Ds. Timusu, Kec. Liliriaja, Kab. Soppeng
8.	Fauzi rahman, S.Hut	M	27	Jl. Kumala II No.7, Makassar/Jl. Sunu, Watansoppeng, Kab. Soppeng
9.	Hasnawati, A.Md	F	NA	Lamalampe, Ds. Lompulle, Kec. Ganra, Kab. Soppeng
10.	Baharuddin	M	50	Sewo, Kel. Bila, Kec. Lalabata
11.	Kamaruddin, SP	M	44	Bellalao, Ds. Soga, Kec. Marioriwawo, Kab. Soppeng
12.	Khadafi Syawal, S.Pt	M	39	Talebba, Ds. Citta, Kec. Citta
13.	Muhammad Ashar	M	26	Jl. Sunu, Kab. Soppeng
14.	Nurfiryal Adiyal	M	26	Ds. Gattareng Toa, Kab. Soppeng
15.	Nurlaelah, SP	F	43	Tajuncu, Ds. Donri-Donri, Kec. Donri-Donri, Kab. Soppeng
16.	Pattawe	M	56	Togigi, Kel., Lalabata Rilau, Kec. Lalabata, Kab. Soppeng
17.	Purnamasari	F	31	Madining, Kec. Marioriawa
18.	Sulaeman, SP	M	39	Jl. H.A. Panne No.162, Macanre
19.	Sumiati, SP	F	31	Jl. Bila Selatan No.65, Soppeng
20.	Syamsuriani, SP	F	26	Kessi, Ds. Gattareng Toa, Kec. Marioriwawo, Kab. Soppeng
V.	**Blitar District, East Java**			
1.	Abdul Madjid	M	57	Jl. Kauman 98, Ngebruk, Sumberpucung, Malang
2.	Agus Sukrisdi	M	54	Jl. Gurami RT.01 RW.02, Tlogo, Kanigoro, Blitar
3.	Bambang Luhito, SP	M	55	Lingkungan Bening RT.04 RW.02, Kel. Jingglong, Kec. Sutojayan, Kab. Blitar

4.	Budiono	M	53	Kel. Jegu RT.4 RW.2, Kec. Sutojayan, Kab. Blitar
5.	Darmini	F	56	RT.01 RW.05 Kel./ Kec. Nglegok, Kab. Blitar
6.	Eko Muryanto, SP	M	58	Jl. Ken Arok No.19A, Wlingi, Blitar
7.	Eny Darmayanti, SP	F	47	Perum GVR Blok C/12, Sanan Wetan, Blitar
8.	Hary Suhermantomo, SP	M	55	Sutojayan RT.1 RW.1, Kec. Sutojayan, Kab. Blitar
9.	Heru Sumarsono, SP	M	57	Ds. Rejo Winangun, Kec. Kademangan, Kab. Blitar
10.	Ir. Wita Triwardhani, M.Agr	F	48	Perum Melati Indah Satu Blok B-4, Blitar
11.	L. Sutjahyono, SP	M	57	Kel. Sutojayan RT.03 RW.01, Kab. Blitar
12.	Pudji Harijanto, SP	M	53	Ds. Bululawang RT.02 RW.02, Kec. Bakung, Kab. Blitar
13.	Pujianto, SP	M	55	Kel. Togokan, Kec. Srengat, Kab. Blitar
14.	Suhariyono	M	57	Jalan Raya Utara 83A, Lodoyo, Blitar
15.	Sukaji, SP	M	58	Ds. Ringin Anom, Kec. Udanawu, Kab. Blitar
16.	Sumali, SP	M	54	Kel./ Kec. Kademangan RT.04 RW.01, Kab. Blitar
17.	Sutrisno	M	54	Talun, RT.1 RW.6, Kel. Talun, Kec. Talun, Kab. Blitar
18.	Trimo, SP	M	56	Ds. Ngletih, Kec. Kandat, Kab. Kediri
19.	Tugito, SP	M	59	Kel. Tawangsari RT.03 RW.03, Garum, Kab. Blitar
20.	Widodo, SP	M	59	Jl. Belimbing No.27, Blitar

C. The list participanct of TOF for Agro-dealers

No.	Name	Gender	Age	Address
I.	**West Sumatra**			
1.	H. Azumar Hasan	M	58	Sei Geringging, Padang Pariaaman
2.	Ulya Diman	M	41	Batang Gasan, Padang Pariaman
3.	Nasrul	M	43	Kuranjihulu, Sei Geringging, Padang Pariaman
4.	Nety Herawati, SE	F	52	Sungai Geringging, Padang Pariaman
5.	Yurnalisman	M	43	Koto Amal, Padaang Pariaman
6.	Dodi Irama, S.Pt	M	45	Malai III oto, sungai Geringging, Padang Pariaman
7.	Bagindo Usman P	M	78	Malai III Koto Sungai Geringging, Padang Pariaman
8.	Meka Nika Tri Suhada, SP	M	29	Luhak Nan Duo, Pasaman Barat
9.	Sri Darmawury	F	47	Jorong Giri Maju, Kec Luhak Nan Duo, Pasaman Barat
10.	Rahmat	M	28	Luhak Nan Duo, Pasaman Barat
11.	Ramadhan	M	47	Nagari Batu Gadang, Kec. Sei Geringging
12.	Andi Candra	M	33	Pilubang, Sungai Limau, Padang Pariaman
13.	Rizky Ferian Adlis	M	25	Kel. Kubu Gadang, Kec. Payakumbuh Utara, Kota Payakumbuh
14.	Syahril	M	42	Koto Bongko, Kec. Sei Geringging, Padang Pariaman
15.	Sadonoyono	M	74	Kec. Luhak Nan Duo, Pasaman Barat
16.	R. Dt. Patiah S	M	62	Nagari Sungai Talang, Kec. Guguak, Lima Puluh Kota

17.	Zulfahmi	M	61	Payakumbuh
18.	Mulyadi Dal	M	62	Kec. Guguak. Lima Puluh Kota
19	Musliadi, ST	M	33	Padang Alai Bodi, Kec. Payakumbuh Timur, Payakumbuh
20	Amrizal, sy, SP	M	55	Balubuih, Kec. Guguak, Lima Puluh Kota
21	Syafri S	M	55	Balubuih, Kec. Guguak, Lima Puluh Kota
22	Mustofa Kamal	M	27	Bt. Gadang Kuranji Hulu, Kec. Sungai Geringging, Padang Pariaman
23	Ramudin M, ST	M	49	Sei, Limau, Padang Pariaman
24	Fitri Sutiyanti	F		Gasan Gadang, batang Gasan, Padang Pariaman
25	Elias, S.Pd	M	33	Nagari Kuranji Hulu, Kec. Sungai Geringging, Padang Pariaman
26	Syafaruddin	M	56	Joronggiri maju, Kec. Luhak Nan Duo, Pasaman Barat
27	Yul Akhiri	M	48	Kec. Sungai Geringging, Padang Pariaman
28	Ichsan	M	38	Koto Baru, Kec. Luhak Nan Duo, Pasaman Barat
29	Indra Sakti LBS	M	36	Luhak Nan Duo, Pasaman Barat
30	Tasril	M	40	Luhak Nan Duo. Pasaman Barat
31	Srinoval Mulyadi	M	45	Joronggiri maju, Kec. Luhak Nan Duo, Pasaman Barat
32	Yanuardet Sutan M	M	55	Joronggiri maju, Kec. Luhak Nan Duo, Pasaman Barat
33	Suhaili	M	NA	Joronggiri maju, Kec. Luhak Nan Duo, Pasaman Barat
34	Indra Budi Lubis	M	29	Joronggiri maju, Kec. Luhak Nan Duo, Pasaman Barat
35	Thoiman	M	48	Joronggiri maju, Kec. Luhak Nan Duo, Pasaman Barat
36	Zulkhailisman	M	46	Sungai Geringging, Padang Pariaman
37	Rendy Mutia	M	20	Sungai Geringging, Padang Pariaman
38	Martius	M	51	Batu Gadang, kec. Sungai Geringging, Padang Pariaman
39	Junaidi	M	45	Koto Aurmaluntang
40	Erwan Zefri	M	36	Jl. Lintang A No 703 Plasma, Pasaman Barat
41	Khotman	M	43	Blok D Plasma, Pasaman Barat
42	Eka Busra	M	31	Pasaman Barat
43	Mukhsin	M	51	Plasma IV Blok G No 576 Pasaman Barat
44	Syafril	M	54	Plasma V Lintang A No 42, Pasaman Barat
45	Fitri Suriyanti, S.TP	F	42	Kec Batang Gasan, padang pariaman
46	Rifky Sunardi	M	31	Balubui, Kec. Guguk, Kab, Lima puluh Kota
47	Harman Alia	M	56	Sungai Balanbiak, Lima Puluh Kota
48	Erwan Misben	M	55	Jorong Tutkar, Guguk, Kec Guguk, Lima Puluh Kota
49	Aziz Roesihan	M	62	Talago, Payakumbuh
50	Nawar, S.Si	M	49	Kel Kapalo Koto, Kec Payakumbuh Selatan, Kota Payakumbuh
51	Franky	M	37	Jl. M Yamin no 97 Pekan Selasa, Payakumbuh
52	Nafilion	M	62	Belubus, Lima Puluh Kota
53	Bonardo Lubis	M	30	Pasaman Barat

II.	**West Sulawesi**			
1.	Ansar, SP	M	53	Desa Seppong, kec. Tammerodo Sendana, Majene
2.	M Said	M	52	Dusun Jolong mea, desa Maliaya
3.	Abidin	M	37	Malaya Utara
4.	Nuralim	M	41	Jl. Poros Majene-mamuju Dusun Bawappu, Desa Mekkatta Kec. Malunda, Majene
5.	Agus S	M	NA	Majene
6.	M. Ali	M	40	Seppong, Majene
7.	Nurhaida	F	36	Desa Mekkatta
8.	Muh. Alwi Hafri	M	24	Majene
9.	Edy, SP	M	40	Bonde-Bonde, kec. Tubo Sendana, Majene
10.	Hardi	M	45	Camba, Majene
11.	Jumali	M	43	Desa Lombang
12.	Muhsin	M	42	Salusambung, Majene
13.	M. Haedar Ali	M	29	Desa Limboro Rambu Rambu, kec. Sendana, Mamuju
14.	Hasriadi	M	50	Totolisi, desa Totolisi, kec. Sendana, majene
15.	M Idris	M	41	Totolisi Tengah, desa Totolisi Sendana, kec. Sendana, Majene
16.	Sahlul	M	52	Pandeng, Majene
17.	Hasman, SP	M	40	Desa Binnga, Kec. Sendana, Majene
18.	Herman, SP	M	41	Jl. Gatot Subroto, Majene
19.	Abd. Wahid	M	40	Malunda, Majene
20.	Sabaruddin	M	35	Limboro, desa Limboro Rambu Rambu, Kec. Sendana
21.	Basruddin	M	42	Kel. Malunda, Kec. Malunda, Majene
22.	Muhammadiah, SP	M	51	Tammerodo, kec. Tammerodo seudana
23.	Jamaluddin, SP	M	NA	Jl. Gatot Subroto, majene
24.	Deppa Bebak	M	45	Desa Boda-Boda, kec. Papalang, Mamuju
25.	Demma Limbo	M	44	Desa Boda-Boda, kec. Papalang, Mamuju
26.	Obednego	M	43	Desa Boda-Boda, kec. Papalang, Mamuju
27.	Yoktan	M	41	Desa Boda-Boda, kec. Papalang, Mamuju
28.	Ambo Asse	M	38	Dusun Pamalaliang, desa Topore
29.	Abd Rahman	M	51	Dusun SalomasaDesa sisango
30.	Muh Hatta	M	41	Dusun Sakio, Dsa Topore, Mamuju
31.	Tasbir	M	46	Dsn Lemba, Desa Papalang, Kec. Papalang, Mamuju
32.	Satir	M	30	Desa Topore
33.	Ashardi	M	31	Desa Boda-Boda, kec. Papalang, Mamuju
34.	Agus	M	28	Dsn Soreang, Desa Boda-Boda, kec. Papalang, Mamuju
35.	Supriadi	M	27	Desa Topore
36.	Sadik M	M	40	Dusun Batu Ampa, desa Batu Ampa, Kec. Papalang,Mamuju
37.	Muslihan	M	36	Dusun Suk Maju, Desa Toabo
38.	M Nasir	M	36	Toabo, Suka Maju
39.	Peri Pensmatana	M	36	Polman
40.	Nurbeti	F	45	Beru-beru
41.	Pasennangi	M	42	Jl. Martadinata, Kec. Simboro, Mamuju

42.	Fajrin	M	31	Dusun Talaba, Desa Belong-belong, Polman
43.	Rahmadi B	M	23	Dusun Talaba
44.	Kaharuddin	M	37	Anreapi, Desa Duampanua, Polewali Mandar
45.	Sirajuddin	M	36	Kel. Pekkabata, Kec. Polewali
46.	Nursaida	F	34	Jalan pendidikan, Polman
47.	Hassani	M	36	Lewukang Tandassura, kec. Limboro, Polman
48.	Abd. Jalil	M	NA	Tapango Barat
49.	Marhana	M	45	Dusun Tangnga-Tangnga, Desa Rappang Barat, Kec. Mapili, Polman
50.	Sahid	M	39	Dusun Tangnga-Tangnga, desa Rappang Barat, Kec. Mapili, Polman
51.	M. Yusup	M	41	Dusun Tanga, Desa Rappang Barat, Kec. Mapili, Polman
52.	Erni S	F	35	Dusun Tangnga-Tangnga, Desa Rappang Barat, Kec. Mapili, Polman
53.	Abdul Rahman	M	32	Dusun 2 Ceppa Desa Botto, kec. Campalagian
54.	Kamaruddin	M	45	Tangnga-Tangnga, Rappang Barat, Kec. Mapili, Polman
55.	Taqwaluddin	M	21	Desa Tapango Barat, kec. Tapango, Polman
56.	Aman	M	43	Tapango
57.	Hamsah	M	44	Desa Riso
58.	Muhammad Hasbi	M	24	Campalagian
59.	Nirwan	M	23	Majene
60.	Muh Ikbal	M	23	Majene
61.	Hasanuddin	M	33	Tapango Barat
62.	Jamaluddin	M	18	Tapango Barat
63.	Muh Ramlan	M	47	Tinambung, kec. Tinambung
64.	Maarifah Dahlan	F	26	Tinambung

C. The list participanct of TOF for Traders/processors

No	Name	Gender	Age	Addres
	I.	**Central Sulawesi**		
1	Armadu	M	57	Desa Ampibabo Utara, Kec. Ampibabo, parigi Moutong
2	Juliadi	M	35	Desa Aloo, Parigi Moutong
3	Alman, SP	M	31	Desa Ampibabo, kec. Ampibabo, parigi Moutong
4	Baitul Zahra	F	18	Sidole Timur
5	Amanu S. Pauta	M	44	Desa Sidole Barat, Kec. Ampibabo, Parigi Moutong
6	Agus	M	24	Sidole Timur
7	I Gusti Ngurah Jono, SP	M	51	Dsn I Desa Buranga, Kec. Ampibabo, Parigi Moutong
8	Nilawati, Spt	F	38	Dusun II, Desa Ampibabo, Kec. Ampibabo, parigi Moutong
9	Eka Sukma Sari	F	32	Jl. Trans Sulawesi, No. 42, Ampibabo Utara, Kec. Ampibabo, Parigi Moutong
10	Nanang, SP	M	36	Ampibabo Utara kompleks perkebunan Ampibabo, Kec. Ampibabo, Parigi Moutong
11	Risnawati Hi. Abd. Rauf, S.Sos	F	27	Desa Toga, kec. Ampibabo
12	Sirman A. Lafadjere	M	43	Sidole Timur

13	Wahyudin, A.Md.pi	M	25	Dampal, Kec. Sirenja, kab. Donggala
14	Drs. Ahlun	M	50	Ampibabo Timur< Kec. Ampibabo, Parigi Moutong
15	Yanti, SP	F	36	Desa Tolole Raya, Kec. Ampibabo, Parigi Moutong
16	Ahmad Sangga	M	57	Desa Toga
17	Nasruddin H A Parenorengi	M	38	Desa Ogodopi, Kec. Kasimbar
18	Jamaludin	M	38	Dusun Sindeleo, Desa Ogodopsi, Kec. Kasimbar, parigi Moutong
19	Haristan Adariku	M	44	Dsn Ranang, Desa Kasimbar Barat, Kec. Kasimbar, Parigi Moutong
20	I Nyoman Sumadi	M	46	Dusun I Santi Baru, Desa Ogodopi, Kasimbar, Parigi Moutong
21	I Nyoman Murniasa	M	46	Desa Posona, Kec. Kasimbar, parigi Moutong
22	Darmawan	M	37	Dsn IV Bampres, desa Posona, Kec. Kasimbar, Parigi Moutong
23	I Nyoman Miasa	M	37	Dusun santi Baru II, Desa Ogodopi, Kec. Kasimbar, Parigi Moutong
24	Hamzah	M	34	Desa Kasimbar Barat, Kec. Kasimbar, Parigi Moutong
25	I Putu Wijaya, SP	M	50	Desa Tovalo, Kec. Kasimbar, Parigi Moutong
26	I Ketut Buana	M	53	Kasimbar Bakat, Kec. Kasimbar, Parigi Moutong
27	I Ketut Suwinasa, SE	M	47	Desa Tovalo, Kec. Kasimbar, Parigi Moutong
28	I Gusti Tunggalyasa	M	41	Dsn Tombi, Desa Tovalo, Kec. Kasimbar, Parigi Moutong
29	Enggang Lamakadi	M	46	Dusun Tampilon, Desa Tovalo, kec. Kasimbar, Parigi Moutong
30	Mudatsir, SP	M	25	Desa Tovalo, Kec. Kasimbar, Parigi Moutong
31	Nurdin	M	48	Desa Larmanta, Kec. Kasimbar, Parigi Moutong
32	Dirwan	M	31	Dusun Tovalo, Desa Tovalo, Kec. Kasimbar, Parigi Moutong
33	Agung Komang Ardita, SP	M	36	Dusun Torabi, Desa Tovalo, Kec. Kasimbar, Parigi MoutongKasimbar
34	Arsam Wahid	M	47	Kec. Kasimbar, Parigi Moutong
35	Wardah, SP	F	36	Sienjo, Toribulu, Kasimbar
36	Andjas Rika, SP	F	NA	Desa Posonta, Kec. Kasimbar, Parigi Moutong
37	Darwis	M	40	Desa Toribulu
38	Bente Lemba Rasunde	M	52	Desa Sibalago
39	Kadir K. L.	M	48	Kec. Toribulu
40	Arman Lawaha	M	47	Desa Sianjo
41	Ikbal	M	15	Desa Toribulu
42	Ruslan	M	32	Dusun IV Desa Toribulu
43	Hamid Saudah	M	55	Desa Sienjo, desa Toribulu
44	Dewa Gede Gunantara	M	40	Desa Sibalago
45	Habudung	M	42	NA
46	Lano A. Siama	M	42	Desa Tomoli Selatan, Kec. Toribulu
47	Sumartin, SP	M	45	Jl. Trans Sulawesi, Desa Toribulu
48	I Dewa Nyoman Widana	M	43	Tomoli Selatan
49	Wayan Percaya	M	53	Dusun I Desa Sibalago
50	Sulastri Pontoh	F	39	Sienjo, Desa Toribulu

51	I Gede Widana	M	29	Desa Sibalago
52	Ramadan	M	37	Desa Toribulu
53	Suhar	M	32	Dusun IV Padaang, Desa Toribulu
54	Hamsin L.	M	NA	Desa Sibalago
		I.	**Lampung**	
1	Ahmad Romlan	M		WR. Sari
2	Dasiono	M		Sukoharjo I
3	Sri Mulyani	F		Banjar Agung
4	Widodo	M		Banjar Agung
5	Masrur Royni	M		BanjarAgung
6	Mustakim Rizal Robani	M		Banjar Agung
7	Suwarno	M		BanjarAgung
8	Suparno A.	M		Banjar Agung
9	Suhadi	M		Banjar Agung
10	Imron Rosadi	M	43	Putra Aji I Kec. Sukadana Lampung Timur
11	Edi Prayitno	M		Banjar Agung
12	Bambang Hadi Kartiko	M		Bumi Mulyo
13	M. Budi Santoso	M		Hanau Berata Bandar Lampung
14	Sumar	M		
15	Sacan	M		Harapan Jaya, Bandar Lampung
16	Budi Waluyo	M		Banjar Agung
17	Tri Hartono	M		Banjar Agung
18	Edy Sukarmo	M		Banjar Agung, Lampung Timur
19	Abdul Jahidin	M		Banjar Agung, Lampung Timur
20	Ponijan	M		Putra Aji I Kec. Sukadana, Lampung Timur
21	Yulinis	F		Sambikarto Kec. Sekampung, Lampung Timur
22	Dewi Kartini	F		Banjar Agung, Lampung Timur
23	Diana Ratna Sari	F		Banjar Agung, Lampung Timur
24	Tri Atmojo	M		Banjar Agung, Lampung Timur
25	Mahfud	M		Banjar Agung, Lampung Timur
26	Suparno	M		Banjar Agung, Lampung Timur
27	Sulardi	M		Putra Aji I Kec. Sukadana, Lampung Timur
28	Suranto	M		Banjar Agung, Lampung Timur
29	Susmi	F		Banjar Agung, Lampung Timur
30	Murtini	F		Banjar Agung, Lampung Timur
31	Samijo	M		Banjar Agung, Lampung Timur
32	Syahri	M		Banjar Agung, Lampung Timur
33	Moch. Solih	M		Banjar Agung, Lampung Timur
		II.	**South Sulawesi**	
1	Nasir	M	37	Dsn Kannung, Desa Batu Alang, Kec. Sabbang, Luwu Utara
2	Arifin	M	47	Desa Batu Alang, Luwu Utara
3	Aris L	M	37	Desa Batu Alang, Luwu Utara
4	Yulis	M	33	Desa Batu Alang, Luwu Utara
5	Hj. Sundari	F		Desa Batu Alang, Luwu Utara
6	Burhanuddin	M	40	Dsn Sumber Ase Selatan, Desa Kapidi, Kec. Mappadeceng, Luwu Utara
7	H. Syamsu		46	Desa Batu Alang, Kec. Sabbang, Luwu Utara
8	Rahman	M	53	Desa Kapidi, kec. Mappadeceng, Luwu Utara
9	Syamsudin	M	39	Desa Batu Alang, Luwu Utara
10	Jamaludin	M	27	Desa Batu Alang, Luwu Utara
11	Kasman	M	42	Desa Kapidi, kec. Mappadeceng, Luwu Utara

12	Sudarno	M	30	Desa Batu Alang, Kec. Sabbang, Luwu Utara
13	Ayyub	M	57	Dsn Labeka, Desa Kapidi, Kec. Mappadaceng, Luwu Utara
14	Nursalam	M	30	Desa Batu Alang, Kec. Sabbang, Luwu Utara
15	H. Amir Tahang	M	55	Desa Batu Alang, Kec. Sabbang, Luwu Utara
16	H. Lamano	M	53	Dusun Ujung Mattajang, Luwu Utara
17	Usman	M	47	Desa mari-Mari, Luwu Utara
18	Abd. Rauf Hasan	M	38	Desa Batu Alang, Kec. Sabbang, Luwu Utara
19	Soalihing	M	51	Desa Batu Alang, Luwu Utara
20	Ronald	M	31	Dsn Sumber Ase Selatan, Desa Kapidi, Kec. Mappadeceng
21	H. Beddu Jama	M	55	Desa kariango, Kec. Baebunta, Luwu Utara
22	Emmang	M	NA	Kapidi, kec. Mappadeceng
23	Wayan Switra	M	47	Desa Kapidi, kec. Mappadeceng, Luwu Utara
24	H. Kamil	M	45	Desa Terpedo Jaya, Kec. Sabbang, Luwu Utara
25	Kamasukri	M	38	Kapidi, kec. Mappadeceng, Luwu Utara
26	Ketut Arya	M	29	Desa Kapidi, kec. Mappadeceng, Luwu Utara
27	Wayan Rama	M	46	Desa Kapidi, kec. Mappadeceng, Luwu Utara
28	Tahang	M	36	Desa Ujung Mattajang
29	Asis Laweng	M	38	Desa Batu Alang, kec. Sabbang, Luwu Utara
30	Ngadoyo	M	62	Ds. Muktisar, Bone-bone
31	H. A. Arsyad	M	46	Desa Kapidi, kec. Mappadeceng
32	Junude	M	51	Desa Kapidi, kec. Mappedeceng
33	Baharuddin H. Bissu	M	44	Ds. Rongkong, Kapidi
34	H. Saha/ Ishak	M	38	Desa Kapidi, Kec. Mappadeceng
35	H. Andi Azis	M	42	Desa Kapidi, Kec. Mappadeceng
36	Hasmin S.	M	46	Desa Sumber Wangi
37	Sahril	M	45	Dsn Sumber ase selatan/Kapidi, kec. Mappedeceng
38	Rahman	M	43	Ds Batu Alang, Kec. Sabbang, Luwu Utara
39	H. Lamma	M	60	Ds. Batu alang, Kec sabbang, Luwu Utara
40	Arifuddin	M	46	Ds. Batu alang, Kec sabbang, Luwu Utara
41	Sukardi H. Lanci	M	43	Ds. Batu alang, Kec sabbang, Luwu Utara
42	Laebe	M	52	Ds. Batu alang, Kec sabbang, Luwu Utara
43	Talib	M	49	Ds. Batu alang, Kec sabbang, Luwu Utara
44	Syarifuddin	M	26	Ds. Batu alang, Kec sabbang, Luwu Utara
45	Syahruddin	M	43	Dsn. Salo Bukkang, Desa Batu Alang
46	Syamsuddin B	M	39	Ds. Batu alang, Kec sabbang, Luwu Utara
47	Supil	M	24	Ds. Batu alang, Kec sabbang, Luwu Utara
48	Hastuti Murdaing, SP	F	33	Desa Mappepeceng

49	Darwis	M	31	Desa kariango, Kec. Baebunta, Luwu Utara
50	Taufik H	M	22	Wasaluba
51	Samid	M	51	Ds. Pongo/Torea, masamba
52	Harjo Susanto	M	41	Ds. Muktisari, Bone-bon
53	Ilyas	M	40	Jl. Asrama Brimob, Luwu Utara
54	Ponari	M	30	Toradda, Kec. Masamba
55	Adi Susanto	M	23	Ketulungan, Kec. Sukamaju
56	Ahmad Husain	M	23	Desa Radda, Kec. Baebunta
57	Nurkayadi	M	38	Desa Hasanah, Kec. Nappedeceng
58	Sucipto Hadi	M	40	Desa asamali, Kec. Mappedeceng, Luwu Utara
59	Misnan Sumarto	M	50	Lettekang, Ds. Arusu, kec. Malangke Barat
60	Sanuddino	M	37	Putemata, Malangke tiga
61.	Khoirul Mustofa	M	19	Kec. Baebunta
62	Amiruddin	M	37	Desa Toradda, Kec. Masamba
63	Mansyor Milu, S.Sos	M	50	Kel. Marobo, kec. Sabbang, Luwu Utara
64	Idris	M	37	Hombes Kanjiro, Bone-bone
65	Sukardy	M	35	Pongo Malimbu
66.	H. Salama	M	68	Desa Kapidi, kec. Mappaddeceng