Farmers‘ initiative in Lam San village

2008: first farmers‘ club

2014: Lâm San farmers cooperative

Goals:

- Sustainable production of pepper, cocoa, coffee and fresh fruits
- Better income for farmers by direct export to high end markets

Grand challenge: food safety and traceability

- Consumers (mainly in the US, EU and Japan) become more demanding on qualities & environmental impacts of goods
- National food and safety regulations become stricter

Farm receives global GAP certification

➡ Demand on certified sustainable products is growing

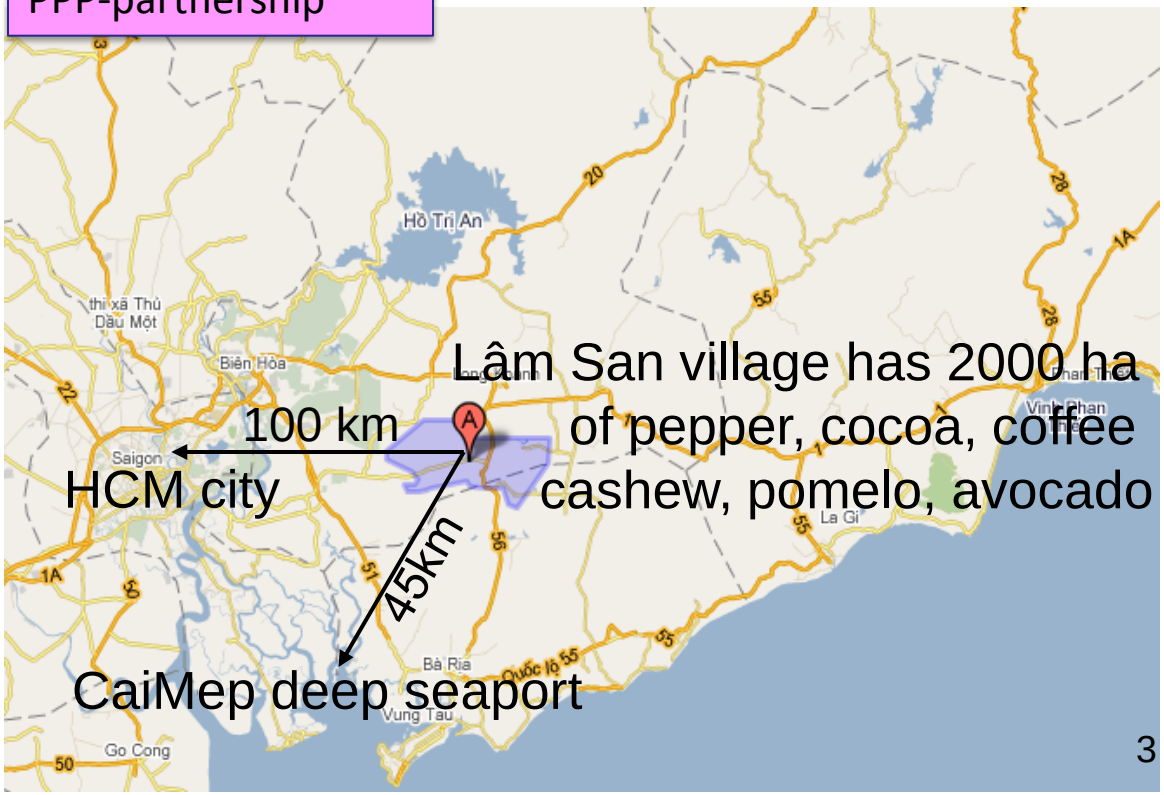
➡ Buyers & producers have to establish a close relationship to ensure food safety & traceability

Farmers‘ initiative for sustainable supply chain

Farmer cooperative → Exporters known to farmers → Importers known to farmers

1200 farmers

GAP -Consultants
PPP-partnership



Implementation at farm level

- Farmers‘ groups (10 – 30 members)
- Knowledge transfer through
  - training courses, seminars
  - consulting directly at the farms

Buyers have to establish closer „ partnership“ and longer relations (term contracts) with cooperative

Industrial partner (2015)

Long term cooperation with FUCHS Gruppe Co. & KG

PPP-project with local government (2018)

Linkage of 721 farmers (877 ha) in Lâm San producing pepper, which is complied with food and environmental standards

Pesticide residue in exported pepper in the EU (2019)

analytical data from every container

MRL	1	0,1	0,1	0,05	0,1	0,1	0,05	0,05	0,3	0,02	0,05
	Chlorpyrifos ethyl (mg/kg)	Carbendazim (mg/kg)	Metalaxyl (mg/kg)	Dimethomorph (mg/kg)	Cypermethrin (mg/kg)	Permethrin (mg/kg)	Imidacloprid (mg/kg)	Acetamiprid (mg/kg)	Difenoconazole (mg/kg)	Anthrachinon (mg/kg)	Azozystrobin (mg/kg)
	ND	ND	0,06	ND	ND	ND	ND	ND	ND	ND	ND
	ND	ND	0,05	ND	ND	ND	LOQ	ND	ND	ND	ND
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ND	ND	ND	0,018	ND	ND	ND	0,017	ND	ND	ND
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ND	ND	ND	ND	0,022	0,006	ND	ND	ND	ND	ND
	ND	ND	ND	ND	LOQ	LOQ	ND	ND	ND	ND	ND
	ND	ND	ND	ND	0,007	ND	ND	ND	ND	ND	ND
	ND	ND	ND	ND	LOQ	LOQ	ND	ND	ND	ND	ND
	ND	ND	0,013	ND	0,011	0,008	ND	ND	ND	ND	ND
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ND	ND	ND	ND	0,05	ND	ND	ND	ND	ND	ND
	0,019	ND	0,012	ND	0,052	ND	ND	0,005	ND	0,012	ND
	0,013	ND	0,006	ND	0,02	0,015	ND	ND	ND	ND	ND
	0,006	ND	ND	ND	0,022	ND	ND	0,016	ND	ND	ND
	ND	ND	ND	ND	0,016	ND	ND	0,013	ND	ND	ND
	ND	ND	0,006	ND	ND	ND	ND	ND	0,006	ND	ND
	ND	ND	ND	ND	ND	0,012	ND	ND	ND	ND	ND
	ND	0,013	0,009	ND	ND	0,011	0,034	ND	ND	ND	ND
	ND	ND	0,029	ND	ND	ND	ND	0,025	0,038	ND	0,025

ND: not detected

We reduced to 50% of pesticide usage in 2020

100% traceable at farm level

Environmental friendly pepper farming

Temporary intercropping with mungbean

Permanent intercropping with coffee cocoa, pomelo, avocado, cashew

Three canopy layers regulate shade intensity for both plants and soil

- using living supports (kapok trees - *Ceiba Pentandra L.)*
- increasing usage of organic fertilizer

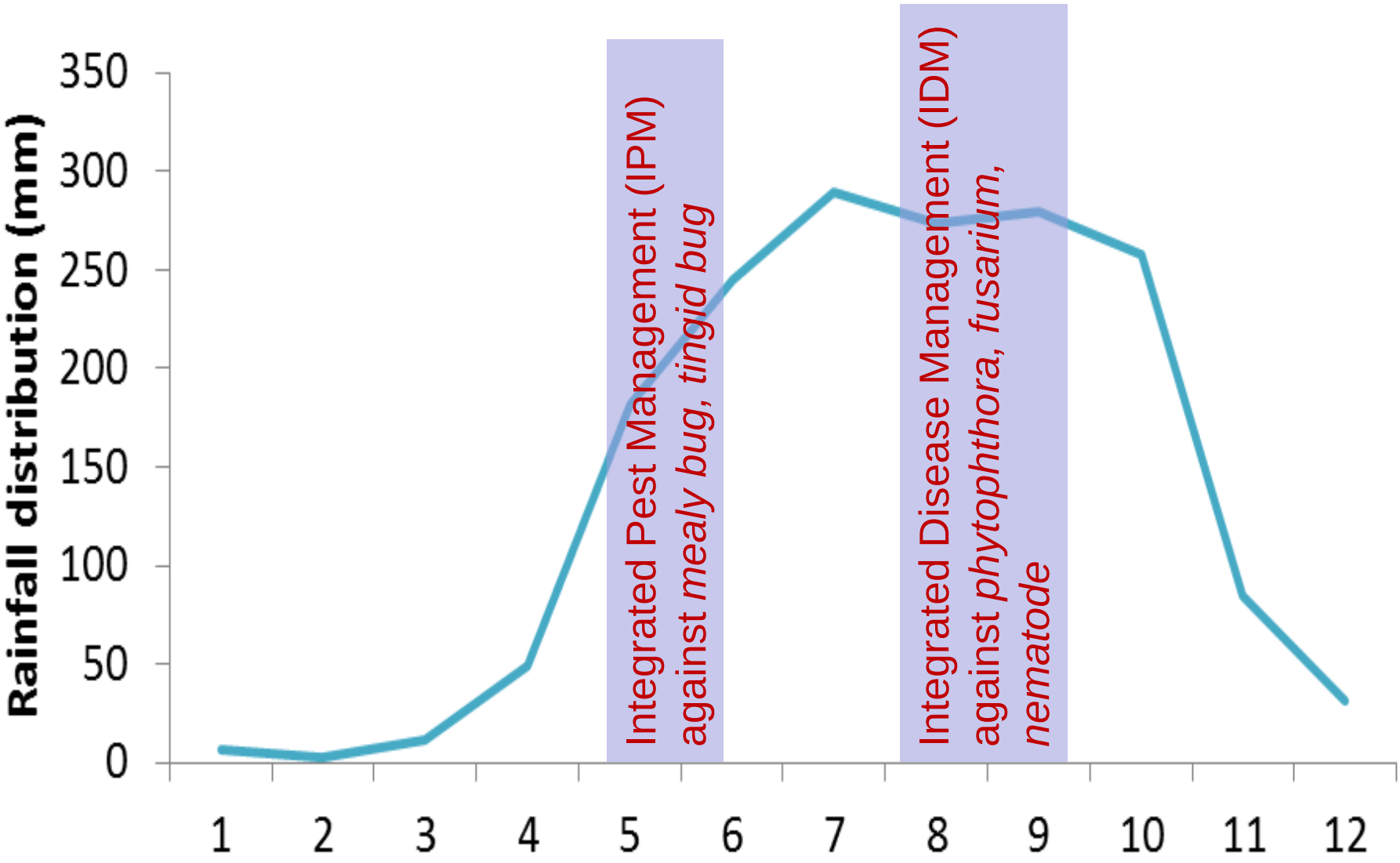
In-farm cascade nutrient supply

Pruned branches from living supports are used to raise goats

- reduce NPK
- improve soil fertility
- reserve C-pool

Goat manure is composted and is brought back to the farms

Crop management

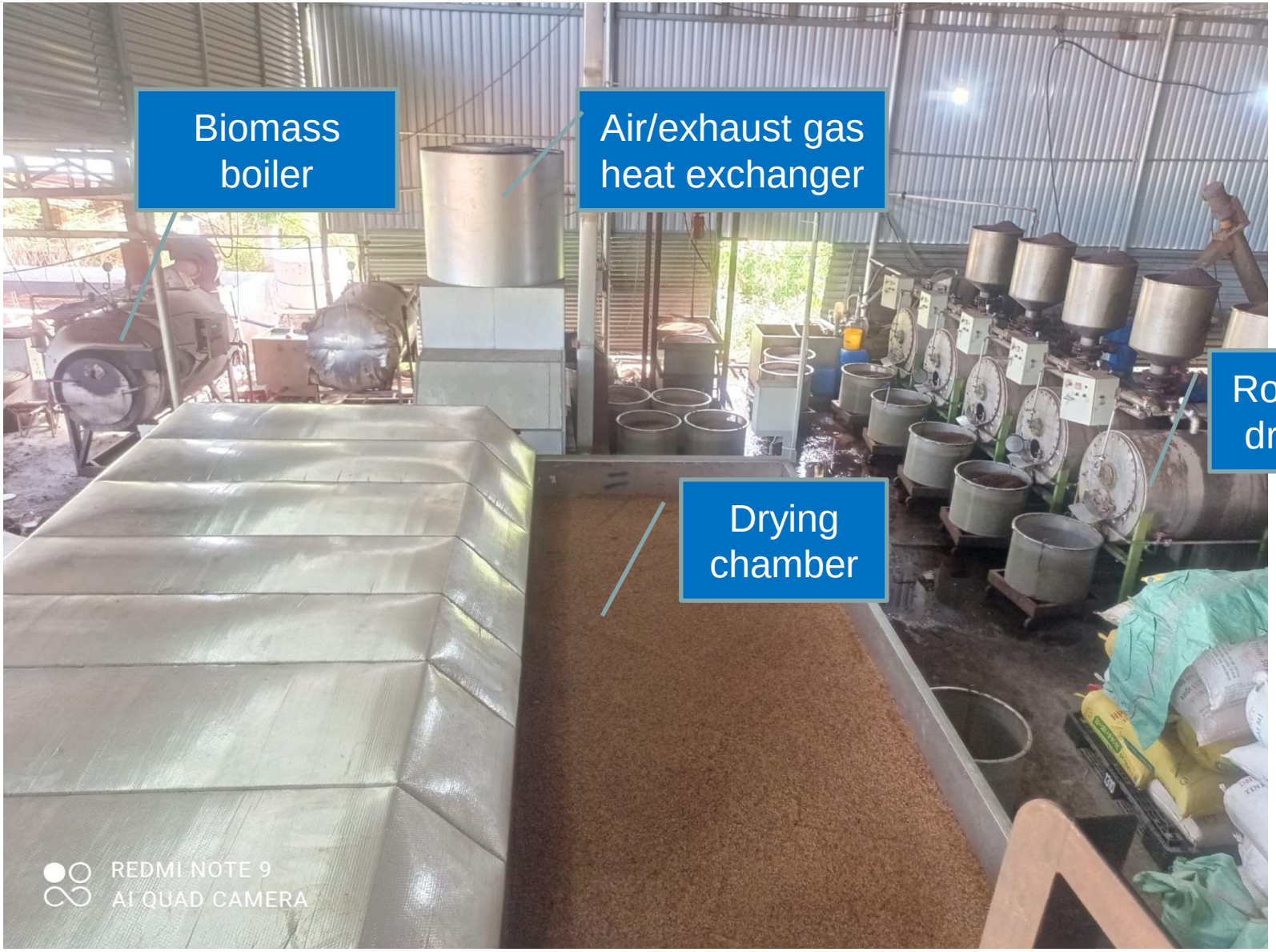


Regular pruning and weeding (3 times/year)

Possible alternatives to synthetic insecticides/fungicides

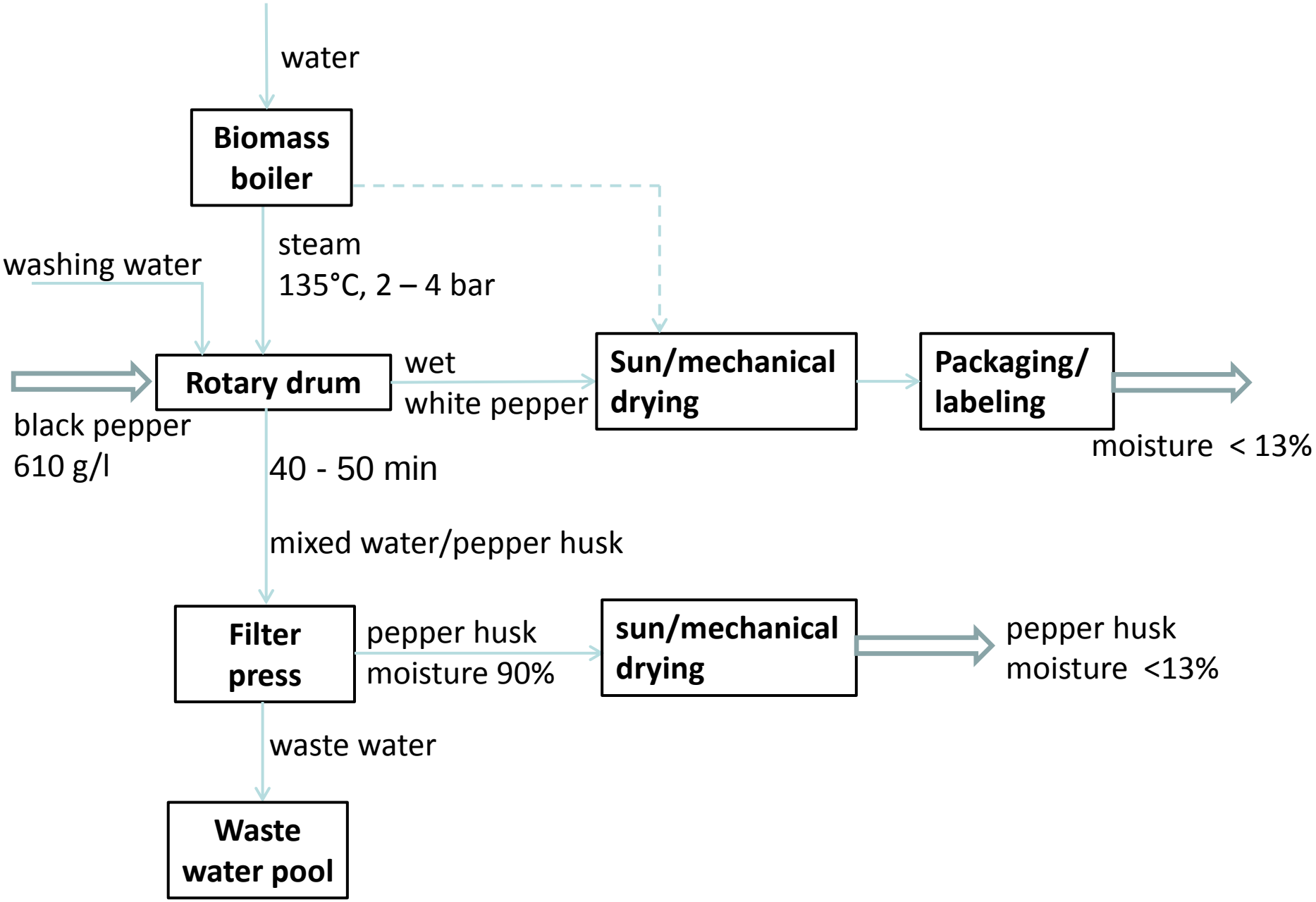
Indication		Non-synthetic chemical measurements
Diseases	Slow decline	Organic amendments, especially composted chicken manure, pH-enhancement (dolomite, CaO), *Trichoderma harzianum, Pseudomonas fl.*
	Quick wilt	Bordeaux mixture, copper oxychloride, *Trichoderma harzianum, Pseudomonas fl.*
Pest	Tingid bug	Mixture of alcohol with chili, ginger and garlic, pepper oil, tobacco extract
	Nematode	Marigolds (*Tagestes erecta*) intercropping, neem cake, tobacco extract, *Trichoderma harzianum, Pseudomonas fl.*

White pepper factory (2019)



Production capacity max. 4 tons/day

Basic flow diagram of white pepper process



GBA

GBAGROUP
FOOD

Certificate of analysis : 21036055 009
Sample name : Organic Pepper white whole

Marking of sample B032720-21000312Lot No.: Sampling according to directive EN ISO 948:2009

Test Results

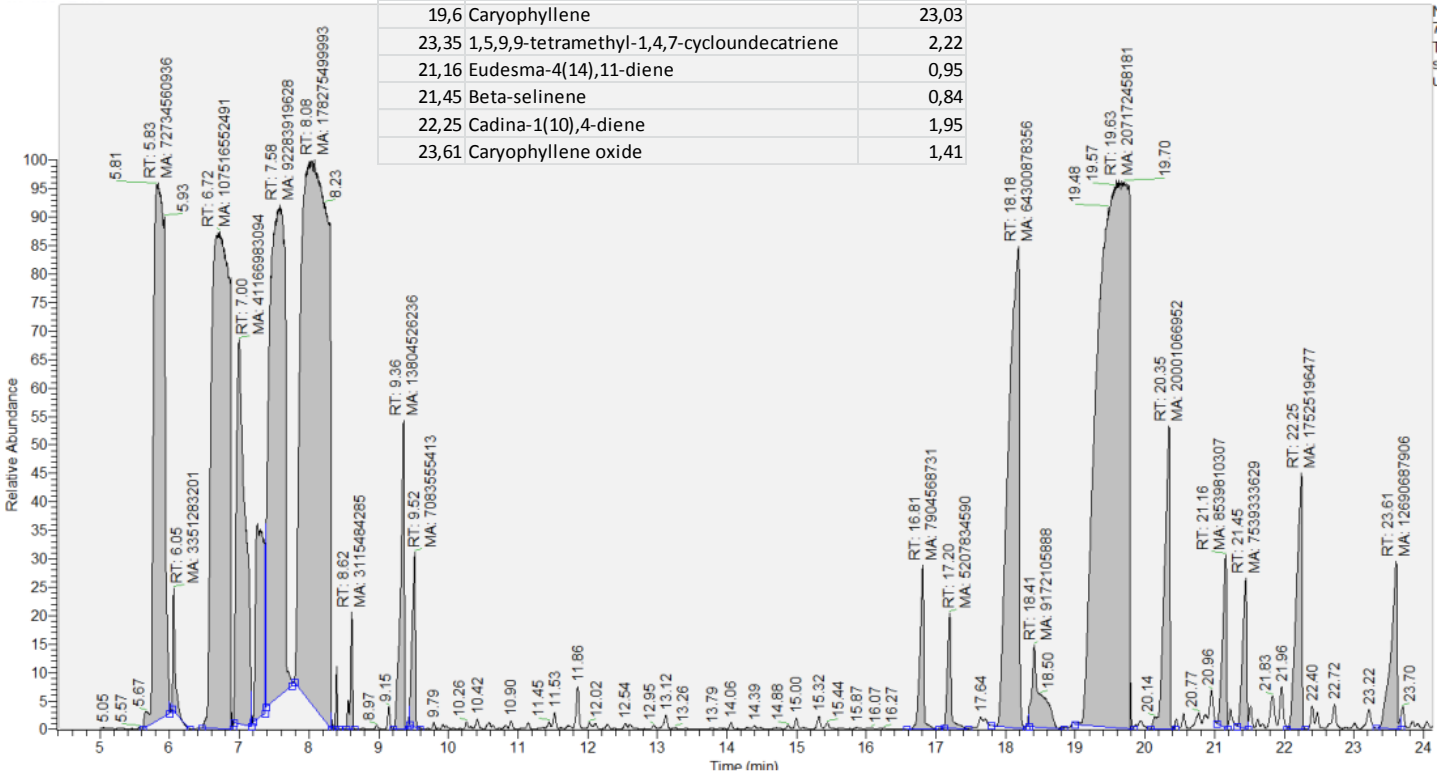
Microbiological Test	*Result*	*Unit*	*Guide value*	*Limit value*
Total Plate Count	<100	cfu/ g		
Yeasts	<100	cfu/ g		
Moulds	100	cfu/ g	1,0 ·10^ 5	
E. coli	<10	cfu/ g	1,0 ·10^ 3	1,0 ·10^ 4
Enterobacteriaceae	<100	cfu/ g		
Bacillus cereus, presumptive	<100	cfu/ g	1,0 ·10^ 3	1,0 ·10^ 4
Staphylococci, coag. positive	<100	cfu/ g		
Clostridium perfringens	<100	cfu/ g	1,0 ·10^ 3	1,0 ·10^ 4
Salmonella	negative	/ 25 g	negative	negative

Guidance and limit values for dried herbs and spices according to the recommendation of the German Society for Hygiene and Microbiology (Deutsche Gesellschaft für Hygiene und Mikrobiologie - DGHM)

Chemical/Physical Test	*Result*	*Unit*
Moisture	12,8	mL/100 g
Ash	2,1	g/100 g
Ash, HCl-insoluble	<0,10	g/100 g
Volatile oil	2,3	mL/100 g DM
Piperine	6,3	g/100 g
Aflatoxins		µg/kg
Aflatoxin B1	<0,50	µg/kg
Aflatoxin B2	<0,50	µg/kg
Aflatoxin G1	<0,50	µg/kg
Aflatoxin G2	<0,50	µg/kg
Aflatoxins, sum	not detectable	µg/kg
Ochratoxin A	0,50	µg/kg

New product: black pepper oil

RT (Min)	Name	Area frac. %
5,83	Alpha-pinene	8,08
6,05	Camphene	0,37
6,72	Beta-pinene	16,53
7,26	2-Thujene	2,14
7,58	3-Carene	10,26
8,04	D-Limonene	19,82
8,39	Beta-ocimene	0,11
8,62	Gama-terpinene	0,35
9,36	p-Mentha-2,4(8)-diene	1,53
9,52	Linalool	0,79
16,81	Delta-elemene	0,88
17,2	Alpha-cubebene	0,58
18,18	Copaene	7,15
18,41	-(cis)-beta-elemene	1,02
19,6	Caryophyllene	23,03
23,35	1,5,9,9-tetramethyl-1,4,7-cycloundecatriene	2,22
21,16	Eudesma-4(14),11-diene	0,95
21,45	Beta-selinene	0,84
22,25	Cadina-1(10),4-diene	1,95
23,61	Caryophyllene oxide	1,41



Organic farming project

8/2020: establishment of Ecological Pepper Cluster consisting of 17 farmers‘ cooperatives in Dongnai, Daknong, Gialai, Baria provinces

2021: total production of 800 tons of organic pepper

Contact address:

Dr.-Ing. Ngoc Luan Nguyen

Hamlet 3, Lam San village, Cam My district

Dong Nai province

Tel. +84-908465916

Email: ngluannguyen@gmail.com