CORE
Metadata, citation and similar papers at core.ac.uk
Provided by Wageningen University & Research Publications

Final report project 'Technological and knowledge support for white potato production and processing in the Philippines 2009-2010'

Compilation of visit reports

Romke Wustman, Linus Franke, Anton Haverkort & Flip van Koesveld

Praktijkonderzoek Plant & Omgeving (Applied Plant Research) and Plant Research International (PRI) part of Wageningen UR
PPO Business Unit Arable crops and field grown vegetables
December 2010

PPO no. 3250135709

© 2010 Wageningen, DLO Foundation
All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the DLO Foundation, Praktijkonderzoek Plant & Omgeving (Applied Plant Research), Business Unit Arable crops and field grown vegetables

The Foundation DLO is not responsible for any damage caused by using the content of this report.

Applied Plant Research (PPO) Project nr. 3250135709

EL&I (LNV) Project nr. BO-10-006-113

Applied Plant Research (Praktijkonderzoek Plant & Omgeving) and Plant Research International (PRI) part of Wageningen UR

PPO Business Unit Arable crops and field grown vegetables

Address : P.O. Box 430, 8200 AK Lelystad, The Netherlands
: Edelhertweg 1, 8219 PH Lelystad, The Netherlands
Tel. : +31 320 291111
Fax : +31 320 230479
E-mail : info.ppo@wur.nl
Internet : www.ppo.wur.nl

Table of contents

page

SUMMARY 5

1 INTRODUCTION 8

2 PROJECT GOALS 10

3 PROJECT TEAM AND VISITS TO THE PHILIPPINES 12
3.1 Project team 12
3.2 Visits 12

4 COMPILATION OF VISIT REPORTS 14
4.1 Report visit 1-7 March 2009 14
4.1.1 Initiative 14
4.1.2 Introduction 14
4.1.3 Goals of the project 15
4.1.4 Potatoes in Philippines 15
4.2 Report visit 22 September – 7 October 2009 20
4.2.1 Perspectives of producing potatoes for industrial processing in the Philippines 20
4.3 Report visit 8-13 April 2010 30
4.3.1 Objective 30
4.3.2 Potential production regions in Mindanao 30
4.3.3 State of the production season 30
4.3.4 Varieties 30
4.3.5 Late blight 30
4.3.6 Institutions 30
4.3.7 Motherland 30
4.3.8 Seed potatoes 30
4.3.9 Prices 31
4.3.10 Production costs 31
4.4 Report visit 30 August – 2 September 2010 31
4.4.1 Objective 31
4.4.2 Retail market process of fresh potatoes 31
4.4.3 Potato chain 32
4.4.4 Processing companies 32
4.4.5 Production of raw material in two phases 32
4.4.6 Farm economy of potato crop production for fresh market and chips processing 32
4.4.7 Production costs on farm 33
4.4.8 Discussion 34
4.5 Report visit 13-14 October 2010 35
4.5.1 Objective 35
4.5.2 Location and date of the meeting 35
4.5.3 Presentations and discussion on challenges 35

5 RECOMMENDATIONS WORKSHOP 14 OCTOBER 2010 39
5.1 Workshop 39
5.2 Participants 39
5.3 Background 39
5.4 Recommendations 39

APPENDIX 1 POTATO PRODUCTION (MT) AND ACREAGE (HECTARE) 41

APPENDIX 2 POTATO PRODUCTION (MT) AND ACREAGE (HECTARE) 43

APPENDIX 3 POTATO PRODUCTION (MT) AND ACREAGE (HECTARE) 45

APPENDIX 4 QUANTITY AND VALUE OF SELECTED AGRICULTURAL EXPORTS, 2000-2006 (QUANTITY IN KG, FOB VALUE IN US $) 47

APPENDIX 5 QUANTITY AND VALUE OF SELECTED AGRICULTURAL IMPORTS, 2000-2006 (QUANTITY IN KILOGRAMS; CIF VALUES IN US $) 49

APPENDIX 6 POTATO PRODUCTION COSTS 51

APPENDIX 7 POTATO PRODUCTION COST 53

APPENDIX 8 RETAIL PRICES POTATOES AND POTATO PRODUCTS 55

APPENDIX 9 POTATO PRODUCTION COSTS OF THE FIRST CYCLE USING NOMIARC SEED 57

APPENDIX 10 MINUTES MEETING NETHERLANDS – PHILIPPINES 'WHITE POTATO IMPROVEMENT PROJECT' AT NOMIARC (MALAYBALAY) ON SUNDAY 11 APRIL 2010 59

Summary

The project was initiated at the request of the Philippine Secretary of Agriculture in Manila. The Netherlands Agricultural counselor (based at Kuala Lumpur) formulated the project idea. The Netherlands Ministry of Agriculture, Nature management and Food quality (currently called: Netherlands Ministry of Economic affairs, Agriculture and Innovations) funded the project. Wageningen University and Research centre (The Netherlands) carried out the project during 2009-2010.

The background of the request of the Secretary of Agriculture was to reduce the increasing costs of import of raw material for the Philippine chips (crisps) producers and to reduce the imports of deep-frozen French fries for the fast food outlets in the Philippines. The secretary aimed at raw material production within the Philippines.

The project goals were:
- to describe the existing potato production, handling, storage and marketing technology
- to describe the present status of the market and trends in production and demand
- to propose new approaches to enhance the potato chain particularly with respect to production, processing and export opportunities to regional markets
- to establish contacts between industrial partners from The Netherlands and The Philippines aimed at increased usage of Dutch technology and expertise in the potato chain both for locals markets and for regional markets
- to pinpoint areas of cooperation and investment for the entire Dutch agro knowledge and industry sector

The project team visited the major potato growing areas in Luzon and Mindanao, met with chips manufacturers, collected production cost data from producers and from the Department of Agriculture and collected price data from retail and whole sale markets.

A seminar presenting the first project findings was held on October 6, 2009 in Manila. A workshop discussing the major project findings and formulating a potato R&D agenda was held on October 14, 2010 in Malaybalay.

The Philippine potato markets has four sub-markets:
1. Fresh (table) potatoes
2. French fries
3. Chips (or crisps)
4. Mashed potatoes

Sub-markets 2, 3 and 4 rely on imports. Reducing imports through local production was the major goal of the project. Raw material production to substitute the imports of deep frozen French fries is not an option, as the Philippine potato growers are presently not able to compete with international French fries producers. Substitution of raw material product for the chips industry was initially considered a feasible option. However an economic analysis showed the low competitiveness of the Philippine potato producers and traders.

The recommendations of the project are summarized below and concentrate on increasing the competitiveness of the Philippine potato industry. Production cost per unit of weight needs to be reduced in order to increase competiveness with imported raw material. The approach consists of four elements:

- Reducing production costs
- Introduction of new varieties
- Further screening of new varieties
- Promoting new varieties

This approach is to be implemented in the fresh market as this is the biggest share of the Philippine potato market.

1 Introduction

The performance of the white potato industry in the Philippines has been lackluster despite the introduction of the right quality seeds and farming techniques, training of farmers and coordination with major institutions (viz, academic, NGOs, Cooperatives, potato liaison centers) dealing with potato, advice on disease control and optimizing yield by commodity experts over the years.

In 2007, the Philippines produced some 110,752 MT which production is spread over four growing areas namely, Cordillera Autonomous Region (85 %), Davao (8.3 %), Northern Mindanao (5.7 %) and Soksargen (0.48 %). Yet in the same period, due to increasing demand (both for consumer and industrial application), the Philippines had to import about USD 26.3 million worth of potatoes or 46,887 MT (30 % of total demand) mostly from Canada, USA and Australia, China, among others for the processing and service industries (viz, fries, chips, starch, etc).

Given the right technology and knowledge support from the Netherlands (which feasibility study will assist decision makers in Dutch agro-industry in providing inputs to efficient production as well as processing capability), the Philippines can lessen its growing dependency on imported finished products. Local production can spur and at the same time, can provide the nutritional requirements and can improve the lot of potato farmers in the process through increased and stable incomes.

Decreasing import dependency on the commodity has been a concern of the Philippine Department of Agriculture whose secretary has set its vision of availing of appropriate and good technology as well as practical expertise and capability to lift the industry. The Office of the Agricultural Counsellor intends to complement the idea by presenting Dutch technology and knowledge for the secretary's consideration.

The Netherland Ministry of Agriculture, Nature management and Food quality funded the project through its BOCI program in 2009 and 2010.

2 Project goals

The project goals were:
- to describe the existing potato production, handling, storage and marketing technology
- to describe the present status of the market and trends in production and demand
- to propose new approaches to enhance the potato chain particularly with respect to production, processing and export opportunities to regional markets
- to establish contacts between industrial partners from The Netherlands and The Philippines aimed at increased usage of Dutch technology and expertise in the potato chain both for locals markets and for regional markets
- to pinpoint areas of cooperation and investment for the entire Dutch agro knowledge and industry sector

The pump priming of the potato industry needs a holistic approach which initially can be directed by a BOCI-funded activity to determine the extent of involvement and exposure of Dutch expertise in the growing, processing and distribution of white potato in the Philippines. Once a guide map has been drawn, it will be easier to pinpoint areas of cooperation and investment (as well as trade) for the Dutch agro-industry be it in selling the right potato cultivars, identifying suitable and optimum growing areas, farm modernization, additional plants for processing (with possibilities for export), mechanization (for efficiency and food safety and quality), etc.

3 Project team and visits to the Philippines

3.1 Project team

The project team consisted of four members:

- Romke Wustman, Applied Plant Research (PPO), Wageningen University & Research center, Lelystad, The Netherlands – project leader
- Linus Franke, Plant Research International (PRI), Wageningen University & Research center, Wageningen, The Netherlands
- Anton Haverkort, Plant Research International (PRI), Wageningen University & Research center, Wageningen, The Netherlands
- Flip van Koesveld, Applied Plant Research (PPO), Wageningen University & Research center, Lelystad, The Netherlands

3.2 Visits

Five visits were paid to Philippines:

- March 2009 — Romke Wustman
- September – October 2009 — Anton Haverkort & Romke Wustman
- April 2010 — Anton Haverkort & Romke Wustman
- August 2010 — Flip van Koesveld & Romke Wustman
- October 2010 — Linus Franke & Romke Wustman

Reports of each visit are included in the final report. Some overlap in the visit reports will occur.

4 Compilation of visit reports

4.1 Report visit 1-7 March 2009

4.1.1 Initiative

The Philippine Department of Agriculture has asked the Office of the Netherlands Agricultural Counsellor in Manila to provide modern Dutch potato technology: knowledge and hardware. The technology is to meet the demands for fresh and processed products: modern cultivars, storage, processing and marketing technologies.

4.1.2 Introduction

Philippines is importing part of its domestic demand: raw material for French fries and raw material for the national potato chips industry.

The table shows a 34.3 % increase in imported potato commodities during 2002-2006.

Table 1 Increase in value (US $) of imported potato products into the Philippines; 2002-2006.

	2002	2003	2004	2005	2006
Increase in value (US $)	35,577,225	35,686,146	44,481,406	43,353,435	47,774,852
% of increase relative to 2002		0.3	25.0	21.9	34.3

The imports consist of deep frozen French fries and raw material for potato chips production.

The import of frozen potato products shows a steady increase: 14 % increase in volume during 2000-2006 (Table 2). The deep frozen potato products are French fries potatoes for final preparation in restaurants and fast food outlets.

Table 2 Import data of deep frozen potato products into the Philippines; 2000-2006.

2000	2001	2002	2003	2004	2005	2006	% change
Quantity (kg)							
27,848,292	30,057,380	29,856,336	29,316,262	34,446,480	30,694,673	31,757,137	14.0
C.I.F. Value (US $)							
16,309,833	17,086,029	15,620,128	15,115,097	18,901,463	17,325,801	19,011,991	16.6

The imported volume in 2006 (31,757 MT) is the equivalent of about 3,200 ha production acreage (assuming a 10 MT yield level per hectare). This acreage is about half of the entire potato acreage in Philippines.

About 17,000 MT are annually imported to feed the raw material requirement of the chips production factories. This is the equivalent of about 1,700 ha of field area.

Total imports equal the production of about 4,900 ha; about 90 % of the total national potato acreage (2006).

The import of seed potatoes during 2000-2006 shows a decline of 96 % (Table 3).

Table 3 Import pattern of seed potatoes in the Philippines; 2000-2006.

	2000 Quantity	2001 Quantity	2002 Quantity	2003 Quantity	2004 Quantity	2005 Quantity	2006 Quantity
Seed Potatoes in kg	1,131,466	756,483	1,169,954	167,971	379,868	190,964	44,000

4.1.3 Goals of the project

- Describe the existing potato production, handling, storage and marketing technology
- Describe the present status of the market and trends in production and demand
- Propose new approaches to enhance the potato chain particularly with respect to production, processing and export opportunities to regional markets
- Establish contacts between industrial partners from The Netherlands and The Philippines aimed at increased usage of Dutch technology and expertise in the potato chain both for locals markets and for regional markets
- Pinpoint areas of cooperation and investment for the entire Dutch agro knowledge and industry sector

4.1.4 Potatoes in Philippines

4.1.4.1 Seasons

Most potatoes are grown in Cordillera Autonomous Region in the northern part of Luzon island (north of the capital city of Manila). Potatoes can be grown throughout the year, but are mainly grown from November – April. Rainfall in the remaining moths limits the growth period
Philippines has two main potato cropping seasons. The wet-season crop, March-July/August and the dry-season crop, October-January/February. Seed from the wet-season crop is stored for the following wet-season crop. A similar practice exists for the dry-season crops. The seed is stored for 8-9 months.

4.1.4.2 Major production regions

Benguet (Luzon province) is the main production region taking care of 63 % of the acreage in 2007 and 72 % of the production. Mindanao island has second position. Appendices 1, 2 and 3 provide detailed statistics.

4.1.4.3 Production regions

In 2007, the Philippines produced some 110,752 MT of potatoes. The production was spread over four growing areas namely, Cordillera Autonomous Region (85 %), Davao (8.3 %), Northern Mindanao (5.7 %) and Soksargen (0.48 %). Yet in the same period, due to increasing demand (both for consumer and industrial application), the Philippines has imported about USD 26.3 million worth of potatoes or 46,887 MT (30 % of total demand) mostly from Canada, USA and Australia, China, among others for the processing and service industries (viz. fries, chips, starch, etc).

4.1.4.4 Storage

Cold storage appears not be practiced despite the apparent advantage of better price setting. Reason appears to be the growers (smallholders) needs the money to pay the costs of production.

4.1.4.5 Seed potato supply

The Baguiet University has a seed potato production scheme. The output appears to be limited; exact production volume were not available with the interviewed parties.
According to CIP sources, Department of Agriculture (DoA) is encouraging the use of better seed potato quality in CAR. DoA has selected a small number of potato growers who have the reputation of better qualified seed potato growers. This effort must path the way for increased use of disease free seed. It can be taken as a first step towards a future certification scheme. Volume of locally

produced seed through a certification scheme were not available.
Most growers take (seed) potatoes from their table stock and store in diffused light conditions (DLS). DLS is a cheap and effective seed storage system; its major advantages being low investment cost and delayed physiological aging.
Cold storage of seed potatoes is not practiced in any area within the Philippines.

4.1.4.6 Varieties

The most commonly grown table potato varieties are: Conchita, Cosima, Granola, Red Pontiac, Solibao (BSU PO3), Franze and Asterix.

4.1.4.7 Diseases and pests

The Cordillera Autonomous Region (CAR) has the longest potato growing history in Philippines. Potatoes are grown in a narrow rotation. Many fields are infested with bacterial wilt (Ralstonia solanacearum) and with Globodera nematodes. Late blight (Phytophtora infestans) is the prevailing fungal disease.

Bacterial wilt affected potato plant in the Bukidnon highlands (April 2010)

4.1.4.8 Growers

Many growers have small holdings and limited funding ability for crop production. The entire crop yield (excluding seed tubers for next plantings) is sold at harvest.

4.1.4.9 Consumption

The bulk of the Philippines produced potatoes are consumed as table potato. The average consumption is calculated at 1.3 kg per capita. The majority of the currently grown varieties has a low dry matter content and are unsuitable for processing.

Plastic wrapped fresh potatoes for sale in supermarket in Malaybalay (September 2009)

Some share of varieties with higher dry matter content are processed into chips (crisps) when supply from abroad is unavailable.

Fresh potatoes wrapped in plastic on display in a Manila super market (March 2009)

The fast food chains Jollibee and McDonalds have quickly gained popularity, they imported 31,757 MT in 2006 and are well established in many cities. Universal Robina Corporation (URC) and Liwayway are established potato chips manufacturers based in Manila.

4.1.4.10 Processing

Experience shows that the prospects of setting up of a raw material production scheme for a Philippines based raw material supply for French fry industry is not to be considered a profitable enterprise. Import of deep frozen material is expected to be cheaper. Therefore imports from USA, Canada, Australia, New Zealand and some NW European countries are expected to continue due to lower costs.

Potato chips on display in a Manila super market (March 2009)

The prospects of setting up a raw material production program for a chips production factory are likely to be more promising. Varieties, storage and processing technology is either available or can be imported. The challenge will be to select disease free production fields; disease free in the sense of absence of soil borne pathogens like bacterial wilt and potato cyst nematodes.

4.1.4.11 Processing industries

The full requirement of French fries for restaurants, fast food outlets is imported. USA based companies are the major suppliers.

Two Manila based companies; Universal Robina Corporation (URC) and Liwayway; process raw potatoes into chips. Their annually imported raw material amounts to about 17,000 MT. URC using 12,000 MT and Liwayway using about 5,000 MT. Liwayway imports 100 %. URC imports about 75 % and sources about 25 % locally. Both companies are interested in procuring locally but they need to have security on supply and quality. Philippine growers are yet to achieve such position.

Raw material supplying countries are: USA (supply October-May), Australia (January-July) and Germany (October-April). A well known chipping variety is Lady Rosetta. Atlantic, Diamant, Fina, Igorota (BSU PO4), Kennebec, Mantañosa and Raja are mentioned as locally grown chipping varieties.

A volume of 17,000 MT chipping potatoes will require about 1,700 hectares (assumed yield level of 10 MT); which is the equivalent of 6,800 ha in a 1:4 crop rotation system. Such arable land appears hard to be found in CAR. Prospects for obtaining such acreage are reportedly much better in Mindanao.

Deep frozen imported French fries in a Manila super market (March 2009)

4.1.4.12 Characteristics CAR and Mindanao

Characteristics Cordillera Autonomous Region (CAR) and Mindanao (Table 4).

Table 4 Characteristics of CAR and Mindanao

Characteristic	CAR	Mindanao
Present acreage	Over 70 %	About 15 %
Field size	Small	Larger
Geography	Very hilly	More flat
Accessibility	Less	Better
Mechanized farming	Difficult	Possible
Investment interest	Limited prospects	Commercial interest
Soil borne pathogens	Infested	Virgin land available
Crop rotation	Rather narrow	Wider to be introduced
Road infrastructure	Steep	Diverse quality

Most interviewed parties (early March 2009) pointed towards Mindanao as offering best prospects for setting up a potato project. Mindanao appears to have better future potato prospects as compared to CAR.
Mindanao island has a number of well equipped ports for shipping seed potatoes, chain equipment and

4.1.4.13 Past initiatives in Mindanao

Commercial investors appears to be interested in agricultural development in Mindanao. A first plan to set up large scale potato production was formulated in 1997 by the Mindanao Potato Corporation (MPC). MPC consisted of a number of Philippines agro business companies. A project proposal was compiled in collaboration with the Netherlands based company Jan Hak & Partners. This proposal failed to materialize due to funding bottlenecks caused by the financial crisis in Asia at that time.

The internationally operating fruit companies Del Monte and Dole have long established interests in large scale pine apple production in Mindanao.

4.1.4.14 Future developments

The expert's findings reveal the potential of increased potato production in Mindanao to serve as raw material supplies of table and chips potatoes. Areas mentioned were:

- Davao
- General Santos
- Malay Balay

Presence of Government and other agencies

- Department of Agriculture (DoA) has set up the Northern Mindanao Integrated Agricultural Research Centre (NOMIARC).
- Agrobusiness investors. There are, reportedly agrobusiness investors interested in further agro market developments in the province.
- The Growth with Equity in Mindanao programme (GEM) has professional potato expertise available in Mindanao.

Potential contributions from the Netherlands:

- Recently developed varieties for table and processing (chips) markets
- Crop production technologies
- Soil borne disease assessment techniques
- Decision Support Systems for late blight control
- Handling and storage hardware
- Capacity building

4.1.4.15 Plan of activities

May – June 2009

- Identification of the potential of Mindanao through a visit and meetings with local stakeholders.
- Identification of the willingness for investment from government and private sources.
- Seek commitment of processing industries to procure raw material from Mindanao
- Seek commitment from table potato retailers for procurement from Mindanao in 2010
- Conduct an economical and technical feasibility study leading to a business plan.
- Formulate a project proposal for developing potato production in Mindanao

4.2 Report visit 22 September – 7 October 2009

4.2.1 Perspectives of producing potatoes for industrial processing in the Philippines

4.2.1.1 Introduction

The Philippines with a population of 98 million on 300,000 km^2 of which 19 % (57,000 km^2 = 5.7 million ha) arable land grow potato on 7,000 ha with and estimated production of about 120,000 t per annum. This means that on average a person eats about 1.2 kg potatoes produced in the country. The national production is all sold on the fresh market and no potatoes produced in the country are currently processed into chips (crisps), extruded products or into French fries. Those products, however, are available in retail and restaurants – notable French fries though e.g. Jollibee and McDonalds quick service restaurants – from imports. Chips are produced nationally (e.g. by URC) from imported fresh potatoes (17,000 t/year). French fries are imported frozen at a quantity of 32,000 t/year. Assuming that 2 tons of potatoes are needed to produce 1 t of French fries this represents a quantity of raw material equivalent to 64,000 t per annum. There also is a not quantified amount of fresh potato imported from China arriving at retail outlets in the Philippines conservatively estimated at 10 % of the volume i.e. 12,000 t per annum. Official statistics show that based on 'raw material' the Philippines import for about 125,000 fresh potato per year. This is twice as much as national production.

Goal of the project: the Philippine Department of Agriculture has asked the Office of the Netherlands Agricultural Councilor in Manila to provide Dutch potato expertise and possibly technology and techniques to add value to the present fresh market chain by exploring avenues of processing potatoes into products at competitive conditions to world markets. The technology is to meet the demands for fresh and processed products: modern cultivars, storage, processing and marketing technologies.

4.2.1.2 Past initiative in Mindanao

Commercial investors appear to be interested in agricultural development in Mindanao. A first plan to set up large scale potato production was formulated in 1997 by the Mindanao Potato Corporation (MPC). MPC consisted of a number of Philippines agro business companies. A project proposal was compiled in collaboration with the Netherlands based company Jan Hak & Partners. This proposal failed to materialize due to funding bottlenecks caused by the financial crisis in Asia at that time.

4.2.1.3 Approach of the project

- Description of the existing potato production, handling, storage and marketing technology
- Description of the present status of the market and trends in production and demand
- Proposal of new approaches to enhance the potato chain particularly with respect to production, processing as to diminish the present dependence on imports of fresh and processed potatoes.
- Establishment of contacts between industrial partners from The Netherlands and The Philippines aimed at increased usage of Dutch technology and expertise in the potato chain both for locals markets and for regional markets
- Pinpointing areas of cooperation and investment for the entire Dutch agro knowledge and industry sector

4.2.1.4 Production conditions

4.2.1.4.1 Seasons and agronomy

Most potatoes (63 % of the acreage and 72 % of production in 2007) are grown in Benguet in the Cordillera Autonomous Region in the northern part of Luzon. Potatoes can be grown throughout the year, but are grown in relatively distinct seasons in Northern Luzon:
wet season planting February-March, harvest June-July
dry season planting September-October harvest – January February
lowland planting winter crop planting October-November, harvest January February (irrigated)
Having crops in the field during the typhoon season (August-September) is risky.
Mindanao in the South has no typhoons and a more regular rain pattern allowing year round production.
All practices are carried out by hand and no part of production is mechanized. Table 1 summarizes the differences in crop characteristics of the Cordillera Autonomous Region (CAR) and Mindanao

Potato fields in the Luzon highlands north of Bagio (October 2009)

Most interviewed parties (early March 2009) pointed towards Mindanao as offering best prospects for setting up a potato project. Mindanao appears to have better future potato prospects than CAR.
Mindanao has a number of well equipped ports for shipping seed, ware and processed potatoes and equipment.

4.2.1.4.2 Seed potatoes

Seed from the wet-season crop is stored for the following wet-season crop. A similar practice exists for the dry-season crops. The seed is stored for 8-9 months. Farmers may keep their own seed potatoes or scout for better fields in the area and make a deal with the grower. Cold storage is not practiced despite the apparent advantage of better price setting, small holders apparently can not store their potatoes under refrigerated conditions.

There are introduction schemes of basic seed material. The Bureau of Plant Industry (part of the department of Agriculture, DA) in Baguio has a rapid multiplication laboratory from which they sell stem cuttings (1 Php each) to interested farmers who grow minitubers from them for own and neighboring farms. Part also goes to the (36 ha) BPI seed farm in Northern Luzon. At Mindanao, NOMIARC (also part of the DA) has rapid multiplication facilities from which they sell minitubers at 2.5 Php each. Some 11 special growers were trained to produce 'certified' seed but the added value was such that after a number of years the interest to be a 'specialist seed grower' disappeared. The facilities are adequate. Demand from farmers, however, is limited. That may be due to insufficient demonstration of improved seed's superiority or the improvement over traditional seed is marginal. All fields visited showed remarkably low incidences of viruses.

Micro tubers and minitubers at the Bagio research station (October 2009)

Volumes of locally produced seed through a certification scheme are not available.

Most growers take (seed) potatoes from their table stock and store in diffused light conditions (DLS). DLS is a cheap and effective seed storage system; its major advantages being low investment cost and delayed physiological aging.

The most commonly grown table potato variety is Granola, others reportedly are Conchita, Cosima, Red Pontiac, Solibao (BSU PO3), Franze and Asterix. The most widely appreciated variety is Granola. Latest seed potato imports of Granola date back to 1983. The degeneration rate of Granola is very low. Igrotta is a variety bred by the Benguet State University, it has a high dry matter content rendering it suitable for processing. The variety has been placed on the National list. Igaroto is a recently released variety developed by the potato breeding program of Benguet State University. The variety has a high dry matter content and is suitable for processing.

Diffused light store for seed potatoes in the Luzon highlands (October 2009)

4.2.1.4.3 Diseases and pests

The Cordillera Autonomous Region (CAR) has the longest potato growing history in Philippines. Potatoes are grown in a narrow rotation. Many fields are infested with bacterial wilt (*Ralstonia*

solanacearum) and with Globodera nematodes. Late blight (*Phytophthora infestans*) is the prevailing fungal disease. The main insect pest is thrips, farmers spray once or twice weekly fungicides against late blight and add insecticide when necessary.

4.2.1.4.4 Production costs

The costs of potato production are specified in appendix 1 and 2. The CIP-UPWARD provided data show the high cost of seed potato: 62 % of total production costs. The table below lists the production costs per ton of potatoes for Philippines, The Netherlands and USA.

Table 5 Potato production costs in Benguet and Mindanao regions

Potato production costs	Php	Euro	US $
Philippines			
Benguet (source: CIP-UPWARD)	16,194	234	341
Benguet (source: local farmer)	10,667	154	225
Mindanao (source: L. Pagane)	13,400	193	282
The Netherlands and USA			
The Netherlands	8,316	120	175
USA (Idaho)	6.930	100	140

The average cost of Dutch and USA produced potatoes is 57 % of Philippines produced potatoes. The production cost of potatoes in Philippines is high compared to The Netherlands and USA (Idaho).

A major question is whether the Philippino potato producer can be competitive with the international market. Processors will consider procuring Phillippino produced raw material on the following conditions:

- Competitive price setting
- Compliance to quality standards at producers' level
- Year round supply

Table 6 The cost of import of raw material for chips production in Manila is displayed in the table below.

Cost of imported raw material for chips production (c.i.f. Manila)				
(source: Liwayway)				
Year	Exporting country	Cost in Euro	Cost in US $	Import tax 40 %
2009	Germany	330		462
2008	USA		450	630
2009	USA		500	700
(source: URC)				
2009	USA		500	700

4.2.1.4.5 Quantitative Potato Data

Area and yield

In 2007, the Philippines produced some 111,000 MT of potatoes. The production was spread over four growing areas namely, Cordillera Autonomous Region (85%), Davao (8.3%), Northern Mindanao (5.7%) and Soksargen (0.48%). Yet in the same period, due to increasing demand (both for consumer and industrial application), the Philippines has imported about USD 26.3 million worth of potatoes or 46,887 MT (30% of total demand) mostly from Canada, USA and Australia, China, among others for the processing and service industries (viz. fries, chips, starch, etc).

Table 7 Potato production (MT) and acreage (hectare) in Philippines (Source: FAO, Rome)

Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Area harvested (hectares)	5,242	5,173	5,328	5,336	5,394	5,446	5,497	5,451	5,600
Yield (MT per ha)	12.13	12.28	12.39	12.657	12.616	12.754	12.763	12.743	12.857
Production (MT)	63,584	63,524	66,016	67,540	68,050	69,456	70,160	69,461	72,000

The areas and production data vary much according to the source. The FAO (Table 4) estimates the area at less than 6,000 and production at 72,000 t. The Department of Agriculture (Table 5) shows statistics with a production of almost 120,000 t grown on almost 8,000 ha. A

survey by the Bureau of Plant Industry in Northern Luzon (table 6) shows figures about twice those of the DA in Table 5. The area in 1998 (believed to have grown considerably since then as much more land has been cleared of forest since) was 11,000 in Northern Luzon yielding almost 300,000 t with average yields well over 30 t/ha. It is important to arrive at the right statistics as it will be a guide towards future actions.

Table 8 Potato production (MT) and area (hectare) in Philippines. (Source: Department of Agriculture, Manila)

Volume

Region / Province	2003	2004	2005	2006	2007
Philippines	68,050	69,456	70,160	69,461	118,497
CAR	51,303	52,495	53,069	52,205	100,752
Cagayan Valley	296	304	284	448	528
Central Luzon	1	1	2	3	3
Bicol region	2	1	1	0	0
Central Visayas	60	57	52	62	58
Northern Mindanao	6,875	6,886	6,663	6,745	6,778
Davao region	8,944	9,053	9,477	9,436	9,811
Soccsksargen	568	659	612	562	566

Area

Philippines	5,394	5,446	5,497	5,451	7,939
Region / Province					
CAR	3,434	3,467	3,502	3,456	5,900
Cagayan Valley	76	77	75	75	78
Central Luzon	1	1	1	1	1
Bicol region	1	1	1	1	1
Central Visayas	23	21	19	19	22
Northern Mindanao	525	533	531	548	556
Davao region	1,267	1,267	1,293	1,280	1,310
Soccsksargen	67	79	75	71	71

Table 9 Data supplied by BPI in Baguio

MUNICIPALITY	AREA (000 HECTARE) CROP			QUANTITY (000) METRIC TON			YIELD (TON/HA)	
	DRY SEASON	WET SEASON	TOTAL	DRY SEASON	WET SEASON	TOTAL	DRY SEASON	WET SEASON
BENGUET								
ATOK	0.702	0.722	1.424	22.451	12.271	34.722	32.00	17.00
KABAYAN	0.123	0.027	0.150	4.069	1.298	5.367	33.08	48.07
KIBUNGAN	0.260	0.244	0.504	6.247	4.399	10.646	24.03	18.03
BUGUIAS	2.512	3.448	5.960	47.718	75.867	23.585	19.00	22.00
BAKUN	0.404	0.815	1.219	8.090	13.855	21.945	20.00	17.00
MANKAYAN	0.642	0.482	1.124	39.168	29.384	68.552	61.00	61.00
MT. PROVINCE								
BAUKO	0.415	0.168	0.583	23.234	7.578	30.812	56.00	45.00
TOTAL	5.058	5.906	10.964	150.977	144.652	295.629	35.015	32.586

SOURCE: GAYAO, B.T. and J.M. SIM, 1990. Potato Investment Profile in the Cordilleras

4.2.1.4.6 Imports of seed, ware and processed potatoes

The import of seed potatoes during 2000-2006 (Table 7) varied between 44 MT in 2006 and 1,131 MT in 2000 with a strong tendency to decrease over the seven year. The reasons so far are unknown by the project team.

Table 10 Import pattern of seed potatoes in the Philippines; 2000-2006.

	2000 Quantity	2001 Quantity	2002 Quantity	2003 Quantity	2004 Quantity	2005 Quantity	2006 Quantity
Seed Potatoes in kg	1,131,466	756,483	1,169,954	167,971	379,868	190,964	44,000

The import, however, of deep frozen French fries and raw material for potato chips production. shows a 34.3 % increase in imported potato commodities during 2002-2006.

Table 11 Increase in value (US $) of imported potato products into the Philippines; 2002-2006.

	2002	2003	2004	2005	2006
Increase in value (US $)	35,577,225	35,686,146	44,481,406	43,353,435	47,774,852
% of increase relative to 2002		0.3	25.0	21.9	34.3

The import of frozen potato products shows a steady increase: 14 % increase in volume during 2000-2006 (Table 2). The deep frozen potato products are French fries potatoes for final preparation in restaurants and fast food outlets.

Table 12 Import data of deep frozen potato products into the Philippines; 2000-2006.

2000	2001	2002	2003	2004	2005	2006	% change
Quantity (kg)							
27,848,292	30,057,380	29,856,336	29,316,262	34,446,480	30,694,673	31,757,137	14.0
C.I.F. Value (US $)							
16,309,833	17,086,029	15,620,128	15,115,097	18,901,463	17,325,801	19,011,991	16.6

The imported volume in 2006 (31,757 MT) is the equivalent of about 3,200 ha production area

(assuming a 10 MT usable for processing yield level per hectare). This acreage is about half of the entire potato acreage in Philippines. About 17,000 MT are annually imported to feed the raw material requirement of the chips production factories. This is the equivalent of about 1,700 ha of field area. Total imports equal the production of about 4,900 ha; about 90 % of the total national potato acreage (2006).

4.2.1.4.7 Consumption

The bulk of the Philippines produced potatoes are consumed as table potato. The average consumption is calculated at 1.3 kg per capita. The majority of the currently grown varieties has a low dry matter content and are unsuitable for processing. The fast food chains Jollibee and McDonalds have quickly gained popularity, they imported 31,757 MT in 2006(equivalent to 65,000 MT potato raw material and are well established in many cities. Universal Robina Corporation (URC) and Liwayway are established potato chips manufacturers based in Manila. Considering local production and imports and calculated as fresh potato weight; annual consumption of potato in the Philippines is about 2.5 kg per person.

Table 1 shows the total quantity of potato imports (fresh and processed) **89,786** MT in 2006 a 26 % increase over 2002. If we assume a recovery rate of 50 % of French fries the 31,757 of French fries represent 63,514 tons of fresh potatoes (+ 31,757). The import of potatoes for chips production in Philippines amounted to 21,297 tonnes; a recovery rate of 25 % results in a local chips production of 5,324 tonnes of chips. The volume of imported chips is 994 tonnes. Total of chips in Philippines is calculated at 6,318 tonnes. Total amount of potatoes calculated as tones of raw material is 88,787 tonnes in 2006. If trends are still up (verify) in 2010 imports are likely close to 100,000 MT.

Transporting potatoes and vegetables from Bagio to Manila (October 2009)

4.2.1.4.8 Processing

Experience shows that the prospects of setting up of a raw material production scheme for a Philippines based raw material supply for French fry industry is not to be considered a profitable enterprise. Import of deep frozen material is expected to be cheaper. Therefore imports from USA, Canada, Australia, New Zealand and some NW European countries are expected to continue due to lower costs.

The prospects of setting up a raw material production program for a chips production factory are likely to be more promising. Varieties, storage and processing technology is either available or can be imported. The challenge will be to select disease free production fields; disease free in the

sense of absence of soil borne pathogens like bacterial wilt and potato cyst nematodes.

4.2.1.4.9 Processing industries

The full requirement of French fries for restaurants, fast food outlets is imported. USA based companies are the major suppliers.

Two Manila based companies; Universal Robina Corporation (URC) and Liwayway; process raw potatoes into chips. Their annually imported raw material amounts to about 17,000 MT. URC using 12,000 MT and Liwayway using about 5,000 MT. Liwayway imports 100 %. URC imports about 75 % and sources about 25 % locally. Both companies are interested in procuring locally but they need to have security on supply and quality. Philippine growers are yet to achieve such position.

Raw material supplying countries are: USA (supply October-May), Australia (January-July) and Germany (October-April). A well known chipping variety is Lady Rosetta. Atlantic, Diamant, Fina, Igorota (BSU PO4), Kennebec, Mantañosa and Raja are mentioned as locally grown chipping varieties.

A volume of 17,000 MT chipping potatoes will require about 1,700 hectares (assumed yield level of 10 MT); which is the equivalent of 6,800 ha in a 1:4 crop rotation system. Such arable land appears hard to be found in CAR. Prospects for obtaining such acreage are reportedly much better in Mindanao.

The country imports about 5,000 tonnes of potato starch per year. This volume equals the production of about 25,000 tonnes of raw material which is the equivalent of about 2,000 hectares of potato cultivation in the Philippines.

4.2.1.4.10 Seminar October 6, 2009

The 80 some delegates of the well attended seminar on Tuesday 6 October 2009 spanned the whole potato supply chain with farmers from Benguet, traders, wholesalers, representatives of the processing (Chips) industry, R&D and policymakers (assistant secretary of agriculture). The program is in appendix 5.

Potato seminar on October 6, 2009 in Manila

Some eye catching phrases during presentations and panel discussion:
In the 60-ies of the last century the Philippines was a rice exporting country now we import food stuffs. Export in future should be possible again (Agr. sec).
Mindanao is to become the food basket of the Philippines with a nautical highway from Davao (or Cagayan de Oro) to Metro Manila. Adequate delivery of potato should be part of that vision (Agr. sec).
Nilo Bautista: late 90-ies we tried to set up a processing potato system at Mindanao for French fries processing: 30 t/ha yield and planting 300 h every month was the target. Fitting in relay crops in the rotation was part of assuring profitability. The Financial Asia Crisis made it impossible to pursue.
The national statistics are not correct as at Northern Luzon we have two cropping seasons (wet and dry) so area and production have to be doubled there (Jocelyn Perez).
Leaf miner fly outbreak in 2000 and PCN (general) were well combated by research. The first by trapping, the second wit *Paecilomyces lilacinus* (Jocelyn Perez).
Q&A:
The seed marketing chain is deficient, solving it should be part of the new activities.
Is northern Luzon already full, saturated with potato? Yes, but Mountain Province still has potential area. The real availability of land, however is at Mindanao.
Agr. sec: I want a plan by mid November and a full roadmap by mid 2010. This seminar is helping me a lot in setting priorities for each group of stakeholders (farmers, traders, …..).
Mayor of Atok at Benguet: we are happy with Igorota and Granola but need additional varieties. We also need an irrigation system to potato in the dry winter. The Emcee answered that it should be requested through local parliamentarians and Haverkort cautioned for yet increasing potato activities: PCN is there because of the intensive cropping (potato 1x or 2 x per year. In Europe only once every 3-6 years !).
We used to have red skinned varieties (Chief Fast Food Dealer Organization) for salad purposes. This can be re-introduced if need be.
Organic potato production is gaining momentum in Philippine potato R&D; both at Benguet State University (BSU) in Baguio and at University of Philippines (UP) in Los Banos.

4.2.1.4.11 Approach 2010
Based on:
- The two visits in March and September/October 2009 (reported above)
- The input and discussions during the seminar (reported above)
- Discussions among Adrie de Roo, Pit Laquian, Anton Haverkort and Romke Wustman

The following was decided regarding follow up and work plan 2010:
- We believe there is sufficient scope to continue the project into 2010
- We will focus on making chips processing potatoes grown domestically competing with imported raw material a viable option
- We will invite Dutch seed potato companies to introduce modern potato varieties for performance testing on fresh consumption and suitability for chip production
- Ideally at the end in 201x 2000 t of seed potatoes would be imported annually from The
- Netherlands, multiplied once at Mindanao and the result (30 t/ha) would yield 20 t of processing potatoes and 10 t of fresh market potato (dual purpose variety needed).
- Therefore in early 2010 a mission is needed to Mindanao to investigate which core group or
- key individual/company could fulfill the role of assuring:
    - seed import
    - contract multiplication with farmers
    - selling/contracts with the processing industry (URC/Liwayway)
- Further – during the same mission – the target area should be identified and its production and transport costs assessed ex ante.
- Business propositions will be formulated for the situation in 2020 and from there back-casting will allow the identification of the parties involved and there successive roles
- These parties likely will fit in a matrix 1) Supply Chain Shareholders (seed import, farmers
- (cooperation or association), traders, transporters nautical highway, processors, retail, consumers) and 2: Interested Stakeholders facilitating the process (Government, Business

association, DA (Nomiarc), Netherlands seed suppliers, Netherlands hardware suppliers)
- Government support is necessary so the Asec agriculture idea of task force around this subject is needed
- Second half of 2010 a business plan finalization meeting by persons, institutions and businesses involved in the future venture will be held at Manila.

4.3 Report visit 8-13 April 2010

4.3.1 Objective

The major objective of the visit was to visit potato fields regarding their suitability to produce aw material for the chips production industry, meet with potato growers and visit potato processing units.

4.3.2 Potential production regions in Mindanao

Bukidnon (Talakag and Malaybalay) grows about 800 ha of potatoes. The potential production area amounts to 2,000 ha. The present Kaptagan acreage is reported to be 500 ha and potential is about 1,000 ha.

4.3.3 State of the production season

Mindanao suffered from a drought period since November 2009. Potato plantings scheduled for March and April were delayed, as fields were too dry. Common potato crop rotation is 1:3.

4.3.4 Varieties

Granola is the dominant variety in Mindanao (and in entire Philippines) as its degeneration rate is low and the variety appears to be more tolerant to Bacterial wilt than other potato varieties. Virus affected plants were hardly observed in Granola crops. BW was found: up to 20 % in a two months crop; the BW level is likely to be higher at harvest time. BW was seed borne, as potatoes were not grown before in this field. Other varieties have been grown but their acreage is very limited. Fields with other varieties were not visited.

4.3.5 Late blight

Control of late blight is a costly affair; spray frequency is 15 to 20 times per (100 days) crop. Daconil, Mancozeb and Koecide (?) are used by farmers.

4.3.6 Institutions

Two D(epartment of)A(griculture) institutes are based in Mindanao. NOMIARC is based in Malaybalay and conducts potato research and produces mini tubers. Potato growers consider the NOMIARC mini tubers as the best quality available. SMIARC is based in Davao and conducts research; research on potatoes ceased in 2002.

4.3.7 Motherland

Motherland operates a tropical fruit processing company selling fruit juices to Nestlé. The company buys its raw material from growers on a daily basis. Raw material is only produced when Nestlé demands supply: Mother is a demand-driven processing company. The fruit supply is guaranteed through contracting outstanding farmers as suppliers; as contracts with regular farmers is often a discouraging affair. The juice is shipped to Manila either by lorry (3-4 days) or by ship. Agri Nurseries (mr. Antonia Tiu) has shipped seed potatoes from Manila into Mindanao by using empty 'Motherland' lorries.The Agri Nuseries experience in organizing growers might be useful for a large scale potato production system.

4.3.8 Seed potatoes

The project team visited five potato fields. NOMIARC produces best quality seed but growers consider the volume insufficient. Price of NOMIARC produced seed is Peso 2.5 per mini tuber; price is subsidized by government. Private initiative should step in and increase the volume. Potato

growers use a once purchased seed lot up to five cycles, as subsequent yields decline due to degeneration. However viruses are hardly found in Granola. The degeneration rate has never been established through experiment. Seed rate is 50,000 per hectare. Farmers store seed in diffused light for a three to five months period.

4.3.9 Prices

The Mindanao potato chain sells fresh product, deep frozen French fries, chips and mashed potatoes.

Table 13 Retail market prices of potatoes and potato products (Cagayan de Oro; April 2010)

Product	Quantity (gr)	Price (Peso)	Price per kg (Peso/kg)
Imported deep frozen French fries	200	32.75	164
Imported deep frozen French fries	400	60.00	150
Imported deep frozen French fries	450	75.00	167
Lays Classic chips	184	103.00	560
Shearer chips	142	99.00	697
Fresh potatoes wrapped in plastic (small = marbles)			35
Fresh potatoes wrapped in plastic (medium)			40
Fresh potatoes wrapped in plastic (large)			45

4.3.10 Production costs

Farmers' estimated production costs based on 100 % seed purchased from NOMIARC lead to an attractive profit margin: Peso 130.000 per hectare. As farmers buy new seed after five cycles the production cost of a crop in its second, third, fourth and fifth cycle is much lower. Averaging the seed cost over five cycles results in a gross profit of Peso 210,000 per hectare at a cost level of Peso 90,000. Potato growing seems a profitable business and we wonder why it is not practiced at a larger extent. Constraint reportedly is the availability of good quality seed. NOMIARC seed is considered outstanding. Despite the high return on investment, private initiatives in seed potato production have yet to start. We could not elucidate what really hampers increase of the acreage; lack of labour, competition with other crops ?

4.4 Report visit 30 August – 2 September 2010

4.4.1 Objective

The major objective of the visit was to meet in Manila with parties with a potential interest in raw material production in potato chips manufacturing.

4.4.2 Retail market process of fresh potatoes

Table 14 Retail market prices of fresh potatoes in Makati, Manila (August 2010)

Product	Price per kg (Peso/kg)
Fresh potatoes wrapped in plastic (small = marbles)	40
Fresh potatoes wrapped in plastic (medium)	59
Fresh potatoes wrapped in plastic (large)	68

Fresh (table) potato retail prices have risen since April 2010. 15 % for small (marbles) and 50 %

for medium and large sized fresh potatoes respectively.

4.4.3 Potato chain

A chain for potato chips manufacturing has four major stakeholders:

- producers
- transporters
- retailers
- processors.

Potato production is currently conducted by small farmers on small, scattered fields in highland areas. Large scale operations to produce substantial volume of high quality raw material for production is a new approach in the Philippines. Outstanding farmers or companies interested in and sufficiently capable to organize and manage large scale potato production have not yet been identified in Mindanao.

Transport is carried out by horses (highland fields to villages), trucks (village to cities) and ships (Mindanao to Manila).

Retailers sell fresh potatoes wrapped in perforated plastic; package sizes vary from a few hundred grams up to about half kilogram. The fresh potato chain has been running for a long time.

Processors of potatoes into chips are well established: Liwayway and Universal Robinia Corporation (URC) both operate potato processing units in Manila. About 20,000 tons of potatoes are annually processed into chips. Both companies import 100 % raw material from abroad but have a definite interest in procuring raw material from production areas within the Philippines. The potato chips chain has been running for about ten years and relies for 100 % on imported raw material.

4.4.4 Processing companies

Universal Robinia Corporation (URC) had indicated not being interested in a follow-up meeting (first meeting took place in March 2009). URC is only interested in purchasing potato raw material from Mindanao once a production system has been set established. So URC's interest is in processing and not in production.

A second visit to Liwayway showed a similar attitude. Liwayway is interested in purchasing Mindanao produced potatoes and formulated some conditions:

1. Problem free fields
2. 1:4 crop rotation: potatoes in a rotation with maize and barley
3. Proper production and handling management
4. Well managed logistics during the Cagayan de Oro (Mindanao) – Manila shipment.

Liwayway puts emphasis on the organisation of production and improvement of management. Their suggestion is to improve on knowledge and management by working in two phases.

4.4.5 Production of raw material in two phases

Liwayway put forward to work in two phases in order to improve on knowledge and enhance management skills.

1. Phase 1 is to concentrate on the fresh (table) potato market through the introduction of new potato varieties. Upscaling of fresh potato production and handling will improve knowledge and management skills.
2. Raw material production for potato chips manufacturing can be started in Phase 2.

Liwayway expects Phase 1 to take some years before Phase 2 can be started.

4.4.6 Farm economy of potato crop production for fresh market and chips processing.

An appraisal of the on farm expenditure and labor requirement has been carried out on the basis of previously obtained production figures. *

The benchmark for one ton of fully conditioned, sorted and compliant to processing standards regarding dry matter content / sugars / browning is: PP 20,000 CIF Manila (Cost Insurance & Freight), which is PP 28,000 including 40 % import duties.

Assumptions:
For ease of projection we consider two basic scenario's

1) An attainable scenario, which is considered feasible when the proper management capacity and production circumstances are met
2) A conservative scenario, which applies conservative (expensive) figures for production costs

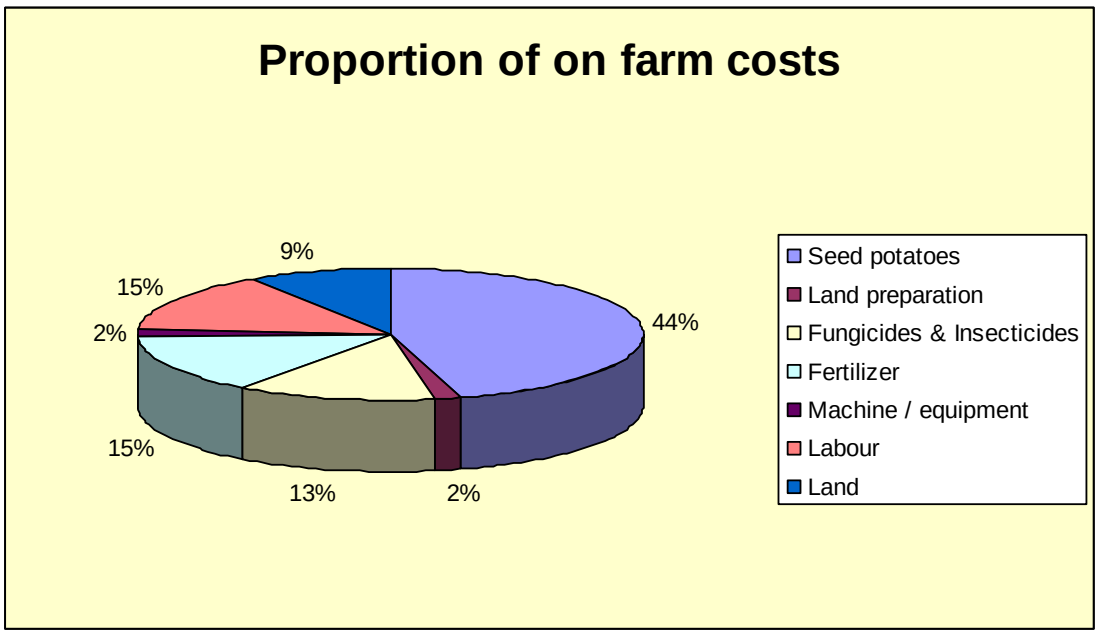
In both scenario's we project an expected yield of 15 tons / HA; all costs are on farm costs. Cost prices are on farm cost prices of bulk products. (no packing / packing material)

Table 15 Base line production data in PHP per hectare in a conservative and an attainable scenario

Base line	**Conservative**	**Attainable**
Seed potatoes	125,000	90,000
Land preparation	5,000	5,000
Fungicides & Insecticides	35,000	30,000
Fertilizer	40,000	50,000
Machine / equipment	5,000	5,000
Labour	40,000	40,000
Land	25,000	25,000
Total costs	275,000	245,000
Yield	15,000	15,000

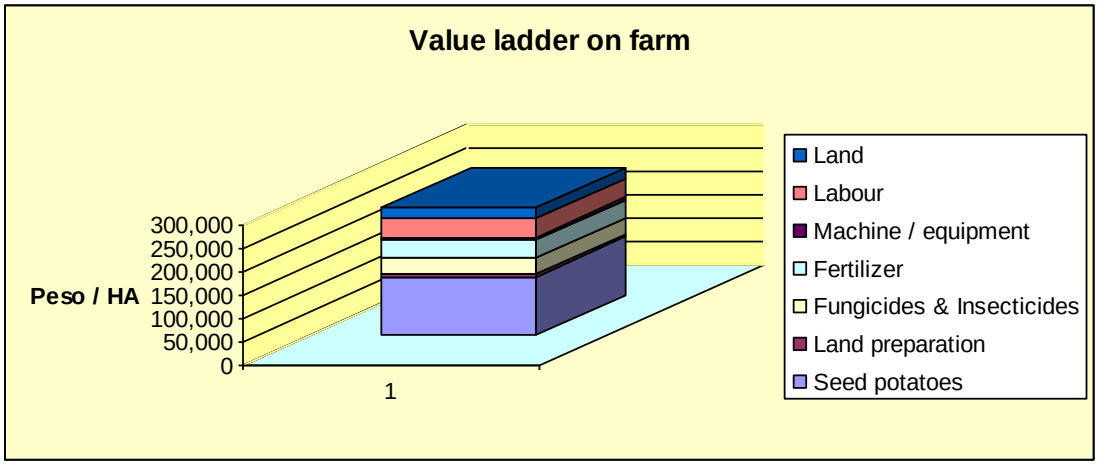
4.4.7 Production costs on farm

The chart below shows the proportion of the various production costs. It is paramount that the cost of seed potatoes, by far is the most important cost factor that accounts for 44 % of costs. This is not only a significant percentage in absolute figures it means that the farmer has to invest between PP 90,000 and PP 125,000 per HA in seed potatoes. Seed potatoes should be reliable, healthy and sound in order to be able to produce the expected yield of 15,000 kg per HA. Careful selection of (pathogen free) production fields and accurate pest and disease control are key factors for successful production.



The so called Value Ladder of Field Production of Potato demonstrates the value of the production column and indicates the potential farmer's revenues. The farmer's revenues are generated from earnings derived from labor and land costs in addition to the sales margin achieved at the market.

The value of one hectare of potato production amounts to PP 245,000 in the attainable scenario to PP 275,000 in the conservative scenario, which translates into a cost price (on farm of PP 16.3 to PP 18.3 per KG) or PP 16,300 to PP 18,300 per ton respectively.



4.4.8 Discussion

In our projection we have been considering an attainable scenario and a conservative scenario. Taking into account a gradual increase in productivity as a result of improved management skills (field selection, seed potato quality, disease control) we anticipate a potential yield increase of 30 % under the Philippine conditions. 30 % yield increase translates into a yield of 19,500 kg/HA. In our attainable scenario, a yield of 19,500 kg/HA shows a cost price of PP 12.6 per KG and PP 14.1 per KG in our conservative scenario.

Table 16 Distribution of cost price on farm at various yield levels.

	Yield/HA	**Cost price**	**Cost price**
		Conservative	**Attainable**
Base line	15,000	18.3	16.3
Yield + 10%	16,500	16.7	14.8
Yield + 20%	18,000	15.3	13.6
Yield + 30%	19,500	14.1	12.6

Cost price of potatoes on farm vary between PP 12.6 and PP 18.3 per KG. For the fresh market these production costs can be considered as reasonable and indicate that a sound handling and marketing margin may be attained.

For processing potatoes for chips processing, the benchmark for imported, conditioned, sorted and quality controlled (variety, sugar, browning, dry matter content) is PP 28 per KG including import duties. (PP 28,000 per ton)

To be able to compete with these processing potatoes on the world market, the Philippine raw material with a farm cost price of PP 18.3 per KG must bridge the gap between farmer's field to Manila for a maximum cost of PP 10 per KG or PP 10,000 per ton.

In the future, when a production cost of PP 12.6 or may be attained, it is the challenge for the processing business to bridge the gap of PP 28 – PP 12.6 = PP 15.4 per KG or PP 15,400 per ton.

4.5 Report visit 13-14 October 2010

4.5.1 Objective

White potato stakeholders' meeting on 14 October 2010

4.5.2 Location and date of the meeting

Location : NOMIARC, Dalwagan, Malaybalay City, Philippines
Date : October 14, 2010

4.5.3 Presentations and discussion on challenges

4.5.3.1 Part I. Presentations

Opening by Juanita B Salvani (Centre Manager NOMIARC)
Introduction of the participants

- Scientists
- Farmers
- Representative from the Agricultural Department

Program
Romke Wustman (Wageningen UR)

- Introduction of the project

Dr. Linus Franke (Wageningen UR)

- Modelling potential potato production in Luzon and Mindanao

The modelling study showed that Mindanao island has a better potential for year-round potato production than Luzon island because of a more equally distributed rainfall pattern over the year and higher radiation levels in the wet season in Mindanao. Year-round supply of potato is one of the conditions of the potato processing industry to source potatoes from the Philippines. Typhoons in July-August and dry spells in December-February at Luzon island prohibit the cultivation of potatoes, resulting in a limited number of months in which potatoes can be planted at Luzon. Research-managed yield levels are up to about two-third of the calculated potential yield levels, according to NOMIARC scientists. Farmers' yield levels are much lower however, indicating there is a considerable scope for increasing yields obtained by farmers. Moreover, the study showed that cooler areas at higher altitudes are more suitable for potato production for the processing industry than warmer areas at lower elevations. Warmer areas are associated with lower potential yields due to heat stress. Moreover, warmer growing conditions favour the production of smaller potatoes with a lower dry matter concentration and a higher reducing sugar concentration, which is undesirable for processing.

Romke Wustman

- The competitiveness of potato production in Mindanao

The study compared the economic competitiveness of raw material for chip potatoes produced in Mindanao with raw material for chip potatoes imported into the Philippines from abroad (Germany, Australia and US). The study concluded that currently raw material from Mindanao is not competitive with imported potatoes. Production costs per kg of potato produced at Mindanao are too high. Estimated input costs equalled 250 000 – 260 000 PHP per ha. Also transportation costs from the field in Mindanao to the chips factories in Manila are likely to be considerable, but need further quantification. A major component (40-50 %) of the input costs is the costs of seed potatoes. Input costs per kg of produce can also be reduced by increasing yield. Production cost per kg potatoes is detailed in the table.

Table 17 Production cost in relation to yield levels

	Yield in kg per HA	Cost price per kg
Base line	15,000	18.3
Yield + 10%	16,500	16.7
Yield + 20%	18,000	15.3
Yield + 30%	19,500	14.1

Current field production cost can be taken to be PHP 18 per kg.

Romke Wustman
- Private Sector Investment (PSI) programme

The conditions for obtaining a PSI grant from the Dutch government are discussed. Possibilities to use a PSI grant to set up a commercial business in seed potato production are explored. If the Philippine potato industry (fresh and processing) is expected to expand in the coming years, the chances to obtain a PSI grant for setting up a seed potato business increase. There must be an economic outlook for independent economic profits in such business.

Ms. Lorena V. Duna (NOMIARC)
- BW screening and adaptability / varietal trials of AGRICO potato varieties

The variety screening program at NOMIARC showed that high yields (up to 45 tonnes per ha) can be achieved at Mindano island. Good management, high fertiliser use, the use of clean seed potatoes, and the use of proper pest and disease management were responsible for these high yields. The variation in yield between years was high. This was partly caused by the selection of new, different (disease free) sites each year. Moreover, the program showed that varieties with a high level of tolerance to bacterial wilt (BW) exist for this region. There was a high variability in performance between varieties. Several varieties were identified that perform better with regard to yield and/or BW tolerance than the variety currently grown by Mindanao farmers. Granola is currently the most common grown variety. Its BW tolerance is moderate compared to a number of the tested varieties. This offers scope for introducing new varieties. These varieties have as yet not been distributed to farmers. The NOMIARC varietal screening program has a set of characteristics to which new varieties need to comply.

4.5.3.2 Part II Discussion on challenges of white potato production in northern Mindanao

4.5.3.2.1 Potato cost structure

First, transportation, packaging, insurance and middlemen costs of moving potatoes from the field in Mindanao to a chips factory in Manila were discussed to complete the cost structure of potato production in Mindanao.

Transportation costs:
- Field - Consolidation area PHP 25-50 per bag of 70 kg
- Consolidation area – Cagayan de Ore (CDO) PHP 60-65 per bag
- CDO – Cebu PHP 130 / carton of 40-60 kg
- CDO – Manila PHP 5-6 / kg potato by road; PHP 20-35 / kg potato by air.

Total costs:
- Approximately altogether PHP 10 per kg from field to Manila
- Middlemen would add PHP 2 per kg
- Packaging costs would make up PHP 1 per kg.

- On top of the above, 10 % reduction in quality occurs due to damage to potatoes and shrinking of potatoes. Thus, for every 10 kg of potatoes transported to Manila, only 9 kg is paid for at the factory.
- Total additional cost are about PHP 13 per kg, leading to a total cost farmers' field Mindanao to Manila as PHP 31 per kg potatoes. This amount is similar to the cost of imported raw material (c.i.f. + 40 % import duties) in Manila. Additional benefits from imported material are; year round supply and compliance with quality characteristics of the chips producers.

It was mentioned that currently potatoes from other parts of the Philippines (Bagyo, Luzon) and from China (illegal imports neglecting the 40 % import tariffs) enter the fresh potato market of Mindanao indicating that Mindanao potatoes are even not always competitive at the local markets. It was concluded that Mindanao potato production can be made more competitive by focussing on a more efficient supply of the market for fresh potatoes. Efficiency gains and new technology should eventually be used to compete on the market for processing potatoes.

4.5.3.2.2 Potato R&D program to enhance competitiveness of the Mindanao potato industry

Next, a discussion on what is needed to make potato production in Mindanao more competitive was held. This discussion resulted in suggestions for a research agenda for potatoes at NOMIARC.

Reducing production costs

To make potato production at Mindanao more competitive, input costs need to decrease and/or yields need to increase. The starting point to reduce production cost per kg is to introduce new varieties with higher yielding ability as the currently dominating Granola variety. Granola variety is only suitable for table consumption. A second way to increase yields is likely to be an improvement of the seed potato supply system. Such seed system should result in lower seed costs.

Introduction of new varieties

All commercial potato growers currently grow the same variety that was released over 30 years ago (Granola). Screening of new varieties at NOMIARC has shown that varieties with better yield characteristics and/or a higher tolerance to bacterial wilt (BW) are available. BW is one of the main soil and seed borne disease constraints to potato production at Mindanao. BW makes potatoes unsuitable for processing by the chips industry. Moreover, Mindanao potatoes currently have a dry matter concentration that is too low for the chips processing industry. Varieties in Mindanao currently have 14-16 % dry matter, 18 % at best, due to the use of an old variety under warm growing conditions. A stable dry matter concentration of more than 22 % is required to fulfil the requirements of the chips industry.

Further screening of new varieties

Further screening of new potato varieties is recommended based on the following traits:

- Bacterial Wilt (BW) tolerance
- High yield
- Yellow flesh colour / yellow skin colour / shallow eyes
- A high dry matter concentration (> 22 %) (requirement of chips industry)
- Good frying quality / low reducing sugar content (requirement of chips industry)

For the fresh potato market, only the first three traits mentioned above are relevant. For the chips industry, the colour of the skin and flesh are less important. Dual purpose varieties (being suitable for both the fresh market and the chips industry) may be preferred, as it gives farmers the flexibility to market the same potatoes through different channels. It was mentioned that variety screening should be done not only at common research sites, but also under typical farmer conditions at higher altitudes.

Promoting new varieties

Besides variety screening, efforts need to be undertaken to make promising varieties available to farmers through:

- agreements with foreign breeding companies owning the varieties
- the registration of new varieties for commercial use in the Philippines
- an effective seed multiplication scheme in Mindanao.

Currently, seed potatoes are multiplied and sold by the public institute NOMIARC. The possibilities to privatise the activity of seed potato multiplication were discussed. NOMIARC does not mind handing over this activity to private partners.

Reducing Bacterial wilt impact
To manage BW in potato sustainably, the release of BW tolerant potato varieties should be combined with management techniques aiming to reduce the incidence of BW. NOMIARC is doing research into techniques for biofumigation of the soil and the use of appropriate crop rotations. Also protected agriculture (the production under plastic sheets) reduce BW incidence as it allows farmers to control soil moisture levels thereby reducing soil bone spread of BW. This work, along with the transfer of knowledge regarding the management of BW to farmers, should be continued.

Poster at NOMIARC, Malaybalay (October 2010)

'Fighting Bacterial wilt through production and promotion of clean and disease-free planting materials'.

5 Recommendations Workshop 14 October 2010

5.1 Workshop

Recommendations of Workshop of the Netherlands funded project 'Technological- and Knowledge-Support for White Potato Production and Processing in the Philippines' on 14 October 2010 in the office of NOMIARC, Dalwagan, Malaybalay City, Philippines

5.2 Participants

The workshop participants originated from:
- Agricultural office, Malaybalay
- Department of Agriculture, Cagayan de Oro
- Potato growers and traders Bukidnon
- Wageningen University & Research center, The Netherlands

5.3 Background

In 2008 the Philippines Secretary of Agriculture requested the Netherlands Embassy in Manila to conduct a study on the Philippines potato industry. The Secretary had noted the increasing imports of raw material for the Manila based potato chips producers and the increasing import volume of deepfrozen French fries for the expanding fast food restaurants within the Philippines.
The Secretary was aware of the increasing amounts of foreign currency involved in such imports.

The Office of the Netherlands Agricultural counsellor made budget available for a two years study (2009-2010) and commissioned Wageningen University and Research centre to carry out the study.

The study was concluded by a workshop held at the premises of NOMIARC.

5.4 Recommendations

The recommendations have a major objective, which is lowering potato production costs at farmers' field. Lower production costs will improve the competitiveness of the Philippine potato production sector. Lower production costs can be achieved by reducing input costs and / or increasing yields. An improvement of the seed potato supply system is likely to improve competitiveness as the variety currently used in the Philippines is unlikely to be the best available variety for Philippine conditions and seed costs make up 30-50 % of all production costs.

Therefore, the following recommendations were derived:
- The potato varietal screening programme will be continued.
- Promising potato varieties will be included in the Recommended list of varieties maintained by the Bureau of Plant Industry.
- Seed potato import of recommended varieties will be implemented.
- Private initiatives in seed potato multiplication will be encouraged.

Appendix 1 Potato production (MT) and acreage (hectare)

Year	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Area harvested (hectares)	5,084	5,242	5,173	5,328	5,336	5,394	5,446	5,497	5,451	5,600
Yield (MT per ha)	12.758	12.13	12.28	12.39	12.657	12.616	12.754	12.763	12.743	12.857
Production (MT)	64,863	63,584	63,524	66,016	67,540	68,050	69,456	70,160	69,461	72,000

Source: FAO, Rome

Appendix 2 Potato production (MT) and acreage (hectare)

Volume

Region / Province	2003	2004	2005	2006	2007
Philippines	68,050	69,456	70,160	69,461	118,497
CAR	51,303	52,495	53,069	52,205	100,752
Cagayan Valley	296	304	284	448	528
Central Luzon	1	1	2	3	3
Bicol region	2	1	1	0	0
Central Visayas	60	57	52	62	58
Northern Mindanao	6,875	6,886	6,663	6,745	6,778
Davao region	8,944	9,053	9,477	9,436	9,811
Soccsksargen	568	659	612	562	566

Acreage

Philippines	5,394	5,446	5,497	5,451	7,939
Region / Province					
CAR	3,434	3,467	3,502	3,456	5,900
Cagayan Valley	76	77	75	75	78
Central Luzon	1	1	1	1	1
Bicol region	1	1	1	1	1
Central Visayas	23	21	19	19	22
Northern Mindanao	525	533	531	548	556
Davao region	1,267	1,267	1,293	1,280	1,310
Soccsksargen	67	79	75	71	71

Source: Department of Agriculture, Manila)\

Appendix 3 Potato production (MT) and acreage (hectare)

	PROVINCES	2000	2001	2002	2003P	AVERAGE	% SHARE
	PRODUCTION (METRIC TON)						
	PHILIPPINES	**63,524**	**66,016**	**67,540**	**68,050**	**66,282.38**	**100**
1	Benguet	42,532	43,234	43,615	44,162	43,385.92	65.46
2	Davao Sur	8,935	8,441	8,887	8,926	8,797.25	13.27
3	Bukidnon	6,206	7,981	7,324	6,875	7,096.69	10.71
4	Mt. Province	4,857	5,343	6,680	7,095	5,993.61	9.04
5	Nueva Vizcaya	228	299	283	285	273.55	0.41
6	Sultan Kudarat	235	207	231	237	227.70	0.34
7	North Cotabato	125	134	147	155	140.16	0.21
8	South Cotabato	136	126	128	114	125.97	0.19
9	Saranggani	34	54	57	62	51.82	0.08
10	Ifugao	47	48	46	46	46.85	0.07
	AREA (HECTARE)						
	PHILIPPINES	**5,172**	**5,322**	**5,366**	**5,394**	**5,313.28**	**100**
1	Benguet	2,767	2,748	2,748	2,762	2,756.25	51.87
2	Davao Sur	1,277	1,250	1,265	1,263	1,263.75	23.78
3	Mt. Province	505	580	635	665	596.25	11.22
4	Bukidnon	411	525	520	525	495.25	9.32
5	Nueva Vizcaya	69	90	73	73	76.25	1.44
6	Cebu	35	27	15	13	22.40	0.42
7	South Cotabato	23	21	22	19	21.25	0.40
8	Sultan Kudarat	19	17	20	23	19.75	0.37
9	North Cotabato	14	16	16	17	15.75	0.30
10	Zamboanga Norte	14	14	15	-	10.75	0.20

Source: Department of Agriculture, Manila

Appendix 4 Quantity and Value of Selected Agricultural Exports, 2000-2006 (Quantity in kg, FOB value in US $)

Commodity Description/Country of Destination	2001		2002		2003		2004		2005		2006	
	Quantity	F.O.B. Value	Quantity	F.O.B. Value	Quantity	F.O.B. Value	Quantity	F.O.B. Value	Quantity	F.O.B. Value	Quantity	F.O.B. Value
Seed Potatoes(Not Sweet Potato)							6,321	14,027				
Potatoes, Uncooked/Cooked By Steaming/ Boiling In Water, Frozen					418	962	312,673	12,980				
Potatoes, Prepared Or Preserved Otherwise Than By Vinegar Or Acetic Acid, Frozen			1,000	1,590								
Total			1,000	1,590	418	962	318.994	27,007				

Source: Statistics office, Government of Philippines, Manila

Appendix 5 Quantity and Value of Selected Agricultural Imports, 2000-2006 (Quantity in kilograms; CIF Values in US $)

Commodity Description	2002		2003		2004		2005		2006	
	Quantity	C.I.F. Value	Quantity	C.I.F. Value	Quantity	C.I.F. Value	Quantity	C.I.F. Value	Quantity	C.I.F. Value
Seed Potatoes(Not Sweet Potato)	1,169,954	326,513	167,971	91,858	379,868	152,499	190,964	70,792	44,000	22,499
Potatoes, Other Than Those Of Sub-Item '054.10-01, Fresh Or Chilled (Not Including Sweet Pot	812,897	239,627	839,520	237,487	2,667,099	757,131	5,026,593	1,381,800	3,932,264	954,644
Potatoes, Other Than Those Of Sub-Item 054.10-01, Fresh Or Chilled (Not Including Sweet Pota	1,118,186	267,738	5,343,459	1,208,868	4,831,118	1,198,811	5,552,061	1,461,198	3,809,502	1,076,546
Potatoes, Uncooked/Cooked By Steaming/ Boiling In Water, Frozen	2,518,343	1,131,700	2,785,199	958,203	2,291,339	794,575	2,275,983	962,882	4,845,243	2,336,870
Potatoes, Wtr/Not Cut/Sliced, Not Further Prepared										
Potatoes, Whether Or Not Cut Or Sliced, But Not Further Prepared	42,767	17,145	942	3,144	73,487	58,922			7,711	11,021
Potatoes, Prepared Or Preserved Otherwise Than	29,856,336	15,620,128	29,316,262	15,115,097	34,446,480	18,901,463	30,694,673	17,325,801	31,757,137	19,011,991

By Vinegar Or Acetic Acid, Frozen										
Potatoes, Prepared Or Preserved Otherwise Than By Vinegar Or Acetic Acid, Not Frozen	388,469	371,523	416,982	456,832	695,902	754,604	908,439	948,489	994,568	947,710
Total	71,425,435	35,577,225	77,323,688	35,686,146	90,074,684	44,481,406	88,388,987	43,353,435	89,786,282	47,774,852

Source: Statistics office, Government of Philippines, Manila

Appendix 6 Potato production costs

Potato production costs (Philippine Pesos) in Davao

LABOR		
Land Preparation		
Deep plowing and 2 passes of harrow	45 Man days	4,500
Planting	20 Man days	2,000
Basal Fertilization		
Hilling up and fertilizer	10 Man days	1,000
Side dressing		
Pesticides Spraying	5 Man days x 8	4,000
Weeding	10 Man days	1,000
Dehaulming	20 Man days	2,000
Harvesting	20 Man days x 2	4,000
Others – Hauling, sorting, cleaning, etc.		
Subtotal		**18,500**
MATERIALS		
Seed tubers @ Php 50/kg	2,500 kgs	125,000
(Sprouted ready to plant @ Php 70/kg)		(175,000)
Fertilizer (assorted) @ Php 1,000.00/bag	35 bags	35,000
Chemicals (assorted)		8,000
Knapsack Sprayer	2 units	4,000
Others		10,000
Subtotal		**182,000**
Over all total		**201,000**
Yield 15,000 kgs	Php 20.00 / kg	**300,000**

Provided by mr. Luis Pagane, Davao (October 2009)

Appendix 7 Potato production cost

Commodity: Potato
Dry Season
Location: Atok, Benguet

Items	Man-days	Cost/unit	Total	Cost per Kg
Sales (Volume) 16,500 kg		**22.46**	**370,590**	
Labor:				
Land Preparation				
- inputed (days)	56	150	8,400	
- Cash (days)	86	150	12,900	
Planting /management				
- inputed (days)	68	150	10,200	
- Cash (days)	40	150	6,000	
Harvesting				
- inputed (days)	15	150	2,250	
- Cash (days)	31	150	4,650	
Hauling (inputs)				
- inputed (days)				
- Cash (days)			1,600	
Transport				
- Cash			1,620	
Sub-Total			**47,620**	
Inputs:				
Seeds (kg)	2,567	25	64,175	
Fertilizer				
Organic (bags)	235	85	19,975	
Inorganic(bags)	19	2067	39,273	
Foliar (liters)	12	165	1,980	
Fungicides (kgs)	38	612	23,256	
Pesticides (liters)	14	562	7,868	
Sub-Total			**156,527**	
Other Cost:				
Rentals			4,000	
Interest Expense				
Depreciation			1,900	
Miscellaneous (meals)			3,000	
Sub-Total			**8,900**	
Total Production Cost			**213,047**	
Marketing Cost				
Labor	35	150	5,250	
Brookers' Fee	20,780	1	20,780	
Transport Cost	20,780	1.35	28,053	
Communication			75	
Total Marketing Cost			**54,158**	
Total Expenses			**267,205**	16.19
Net Income			**103,385**	

Provided by CIP-UPWARD, Los Banos (March 2009)

Appendix 8 Retail prices potatoes and potato products

Retail prices (September-October 2009) in various markets within Philippines.

Retail prices in Rustam supermarket Manila (September – October 2009)

Product	Package	Price/item (Pesos)	Quantity (gr)	Price/kg (Pesos)	Price/kilogram (Euro 1 = PhP 69.59752)	Price/kilogram (US $ 1 = PhP 47.69665)
deepfrozen French fries	plastic bag	52.00	450	116	1.66	2.42
deepfrozen French fries	plastic bag	75.50	450	168	2.41	3.52
deepfrozen French fries	plastic bag	109.00	2050	53	0.76	1.11
deepfrozen French fries	plastic bag	169.00	907	186	2.68	3.91
fresh potato Big	plastic bag	90.00	1000	90	1.29	1.89
fresh potato Jumbo	plastic bag	95.00	1000	95	1.36	1.99
fresh potato Marbles	plastic bag	45.00	1000	45	0.65	0.94
fresh potato Regular	plastic bag	80.00	1000	80	1.15	1.68
Lays chips	sealed bag	99.50	184	541	7.77	11.34
Lays pringles	can	63.00	120	525	7.54	11.01
mashed potato	carton box	137.50	377	365	5.24	7.65
Raffles chips	sealed bag	99.50	184	541	7.77	11.34

Trading post (whole sale) Baguio

Wholesale prices potatoes at Trading Post Baguio 2 October 2009

Product	Package	Price/item (Pesos)	Quantity (kg)	Price/kilogram (Pesos)	Price/kilogram (Euro 1 = PhP 69.59752)	Variety
fresh potatoes regular	plastic bag	640	16	40	0.57	Igrota
fresh potatoes Jumbo	plastic bag	720	16	45	0.65	Igrota
fresh potatoes marble	plastic bag	320	16	20	0.29	Igrota
fresh potatoes regular	plastic bag	300	15	20	0.29	Granola
fresh potatoes Jumbo	plastic bag	435	15	29	0.42	Granola

Appendix 9 Potato production costs of the first cycle using NOMIARC seed

Potato production costs of the first cycle (using NOMIARC seed)

Seed potatoes (NOMIARC)	seed rate 1500	100,000
Fungicides		22,500
Insecticides		
Chicken manure	100 bags @ 50 kg	8,500
Mineral fertilizer	Urea; 0:0:60; 14:14:14	19,000
Labour		20,000
Total cost		170,000
Yield (15 tons)	15 tons/ha	300,000
Gross profit		130,000

Potato production costs of the first cycle (using farmers' saved seed)

Seed potatoes (NOMIARC)	seed rate 1500	0
Fungicides		22,500
Insecticides		
Chicken manure	100 bags @ 50 kg	8,500
Mineral fertilizer	Urea; 0:0:60; 14:14:14	19,000
Labour		20,000
Total cost		70,000
Yield (15 tons)	15 tons/ha	300,000
Gross profit		230,000

Potato production costs of the first cycle (using farmers' average seed cost)

Seed potatoes (NOMIARC)	seed rate 1500	20,000
Fungicides		22,500
Insecticides		
Chicken manure	100 bags @ 50 kg	8,500
Mineral fertilizer	Urea; 0:0:60; 14:14:14	19,000
Labour		20,000
Total cost		90,000
Yield (15 tons)	15 tons/ha	300,000
Gross profit		210,000

Source: NOMIARC, Malaybalay (April 2010)

Appendix 10 Minutes meeting Netherlands – Philippines 'White potato improvement project' at Nomiarc (Malaybalay) on Sunday 11 April 2010

Present:
Juanita Salvani, Lito, Lorraine, Antonieta, Anton Haverkort, Romke Wustman`

Meeting October 2010
- A meeting at Nomiarc will be held either on Thursday 14 or Thursday 21 October 2010.
- The meeting will focus on the results achieved by the project in 2010.
- The aim of the meeting is to form a consortium committed to invest in the supply chain of a chips (crisps) producer using raw material produced in Mindanao.

Meeting
- Participants
    - Nomiarc (> one participant)
    - Procurement official Liwayway
    - Procurement official URC
    - Trader
    - A few outstanding potato growers
    - D(epartment)A(griculture) coordinator high value crops
    - DA mrs. Ramos
    - DA undersecretary Joel Rudinas
    - Agriculturist Malaybalay (if considered necessary)
    - Agrico potato company (Netherlands)
    - HZPC seed potato company (Netherlands)
    - Wageningen UR: Linus Franke, Romke Wustman
- Number, location, duration
    - Number of participants: maximum 15.
    - Location of the meeting; Nomiarc facilities at Malaybalay.
    - Duration of the meeting: starting at 8 o'clock and maximum one day.
    - Overnight stay at Nomiarc facilities.

Proposed agenda
- Presentation Nomiarc: Results of potato varietal screening experiments
- Presentation processor(s): import volume, quality requirements of raw material
- Presentation Linus: Results potato growth modeling
- Presentation Romke: Results cost and benefit analysis of raw material production
- Presentation Romke: Organizational aspects of raw material production
- Discussion
- Commitment to investment in a raw material production scheme for cips production.

Potato varietal screening
- Nomiarc has screened Agrico varieties since 1994. **Nomiarc** will screen HZPC varieties upon the request of HZPC.
- **Romke** will establish the bilateral contact HZPC - Nomiarc.

Data required for potato growth model
- **Nomiarc** has sent climate data to Linus, which apparently did not arrive. **Romke** will resend the data to Linus.
- **Nomiarc** will provide the data required for the potato growth model scenarios to Linus.
- **Linus** will calculate potential yield levels for some altitude levels in Mindanao region.