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Swiss Agency for Development
and Cooperation SDC



SUMMARY RESULTS OF MONGOLIAN POTATO PROGRAMME



2004-2015

POTATO=BREAD



Photo credits to SDC Mongolia, MPP



Forward by Director of Cooperation, SDC

Potato is, after meat and wheat flour, an important source of nutrition in Mongolia. In 2004, the annual consumption of potato barely reached 30 kg per capita, from which two thirds were imported. Most of the locally cultivated potato varieties were still the same as in the socialist period, with long vegetative periods and relatively low yields.

Responding to an invitation from the Government of Mongolia, the Swiss Agency for Development and Cooperation (SDC) started supporting the potato sector. The first project "Revitalization of Mongolia's Potato Sector Programme" (2004-2007) imported new varieties and started screening their adaptability to the Mongolian conditions. After the first positive results, the project established a seed multiplication scheme. The improved varieties showed to be locally well adapted, being more drought resistant, maturing earlier and producing higher yields. In the following years the farmers started replacing the old varieties with the new ones, contributing to increased availability of table potatoes at affordable prices and to food security in the urban areas.

Later, SDC mandated the "Mongolian Farmer Association for Rural Development (MFARD)" with the project implementation (2007-2015). Today, after 12 years of Swiss support, we can look back at impressive results: Farmers use healthy potato seeds of high performing varieties produced in Mongolia; the potato yield increased constantly from less than nine tonnes per hectare to over twelve tonnes, reaching peaks of more than seventeen tonnes in favourable years.

As a consequence, imports decreased constantly and Mongolia reached self-sufficiency in 2011. The year-round availability of locally produced potatoes reinforced consumer habits changes, especially in the growing urban centres, bringing the national per capita consumption up to over 61 kg in 2014.

Towards the end of the current support, SDC commissioned a cost-benefit analysis of the potato sector, which confirmed that the seed production is profitable and brings a respectable return on investments. The success in the potato support is attributed to the alignment to the government policy and the well-established Mongolian Farmers Association for Rural development (MFARD) with representation all over the country.

During the last years, the potato project extended its activities starting producing seeds of the most common vegetables. First promising results showed the potential of this sector and convinced SDC to extend its support for the coming four years. SDC is confident that the results in the vegetable sector will be as positive as those in the potato sector.

Concluding, I would like to acknowledge the key role played by MFARD in this success story as well as thank the commitment and professionalism of its management and staff.

Director of Cooperation, Swiss Agency for Development and Cooperation (SDC)

Markus WALDVOGEL

A handwritten signature in dark ink that reads "Markus".



Foreword by the Coordinator of Mongolian Potato Programme

Our team has successfully implemented the Mongolian Potato Programme, with financial support from the Swiss Agency for Development and Cooperation, throughout three phases since 2004, and has achieved the expected programme goal. In the 12 years the programme has been operating, we have addressed potato production in Mongolia and have introduced new technologies to farmers, built capacity through financial support, released seven new potato varieties, created a nationwide seed multiplication network, and supported the vegetable industry.

Prior to the introduction of the programme, Mongolia's potato seed system had declined due to a lack of appropriate policy and farmers relying on unknown varieties. Forty-five percent of the country's demand for potatoes was met by imports of uncertified Chinese potato. This situation changed when, as a result of the programme's interventions, farmers' income increased and their

livelihoods improved by planting newly released potato varieties. Such was the success that potato farmers were able to fully meet national potato demand and export surplus potatoes. Potato production is now one of the most stable and productive sectors in Mongolia, and it's my pleasure to thank all stakeholders for their hard work and support.

We wish all the best to farmers, seed multipliers, state research staff, and the international and domestic partners who have collaborated with us in the past 12 years and who have contributed immensely to the programme's progress. May you find success in your future endeavours and may you have a plentiful harvest.

Coordinator of Mongolian Potato Programme

T. Turmandakh

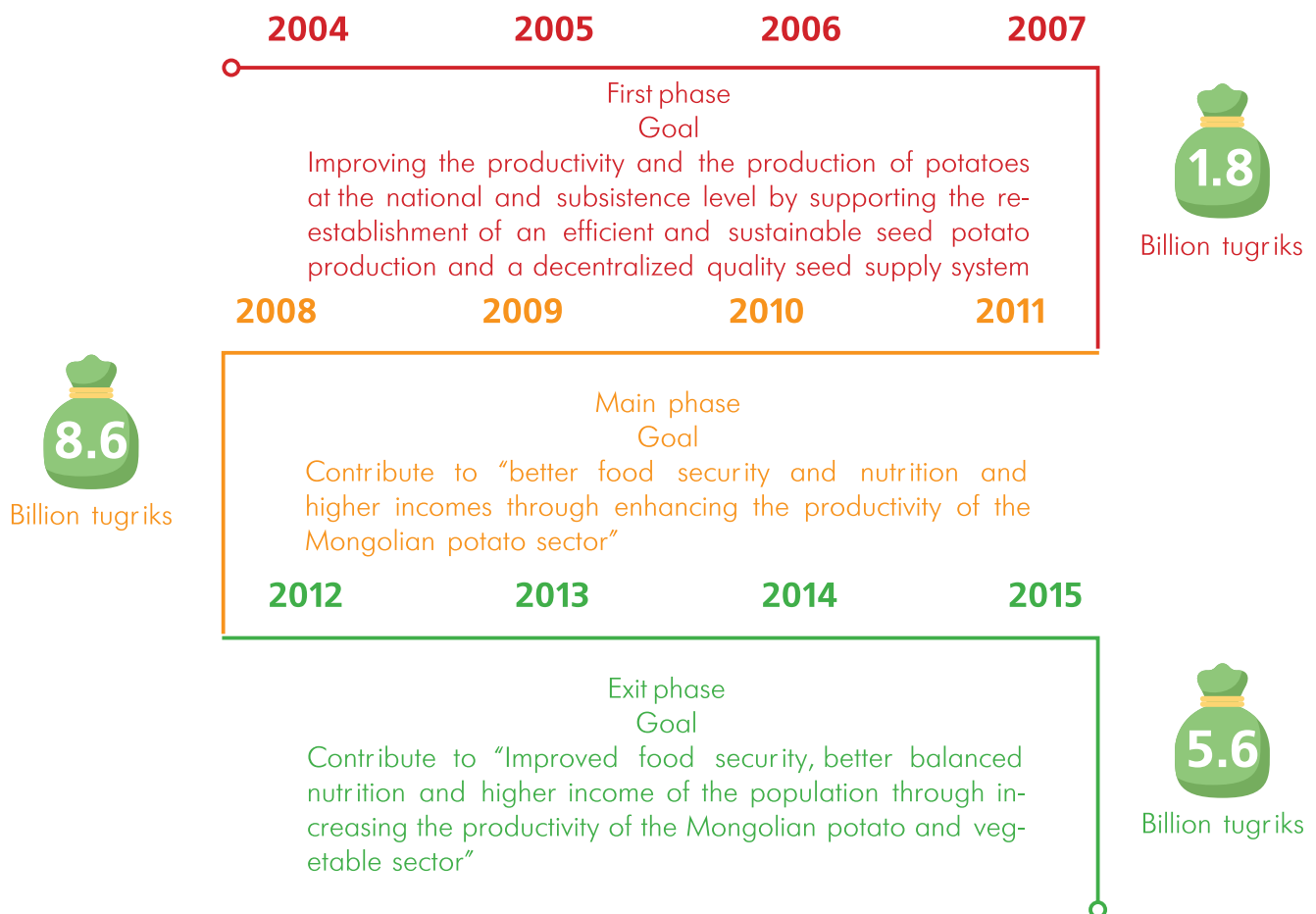
FIRST PART

SUMMARY OF RESULTS



HISTORY OF THE MONGOLIAN POTATO PROGRAMME

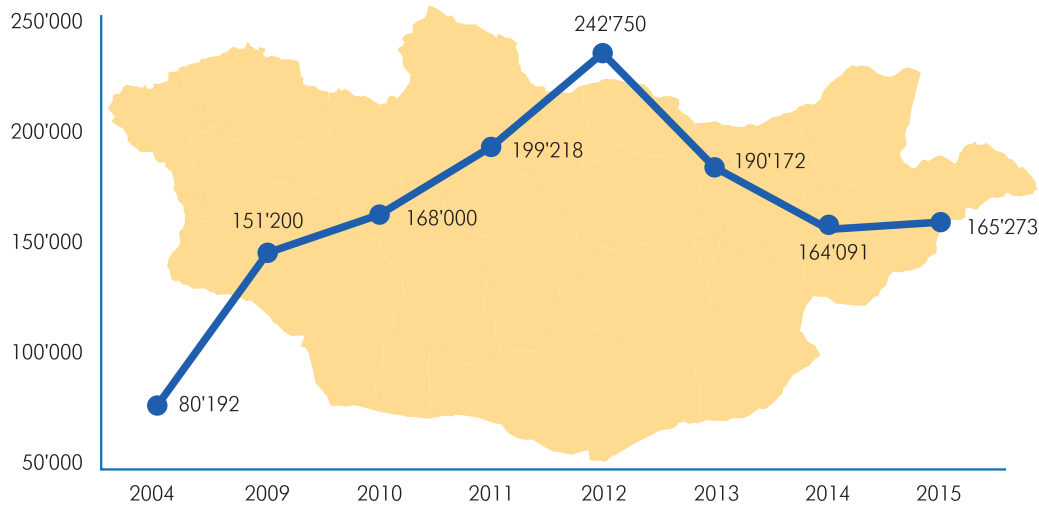
Requested organization:	Ministry of Food and Agriculture (MoFA)
Funding organizations :	Swiss Agency for Development and Cooperation (SDC) Government of Mongolia (GoM)
Duration:	12 year (2004-2015)
Budget: SDC	CHF 8 million (MNT 16 billion; rate as of 2015)
GoM,MoFA	CHF 1 million (MNT 2 billion; rate as of 2015)
Implementing organization:	
2004-2006	Consortium of MonConsult LLC and the “Mongolian Farmers’ Association for Rural Development” NGO
2007-2015	“Mongolian Farmers’ Association for Rural Development” NGO



MAIN ACHIEVEMENTS OF THE MONGOLIAN POTATO SECTOR

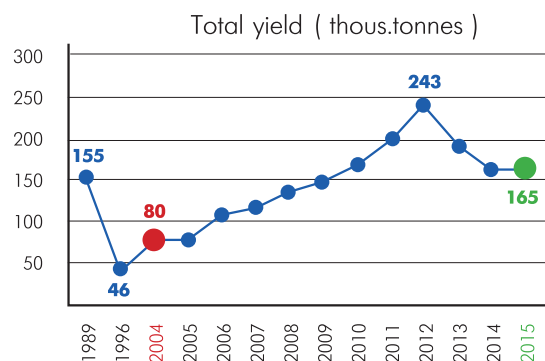
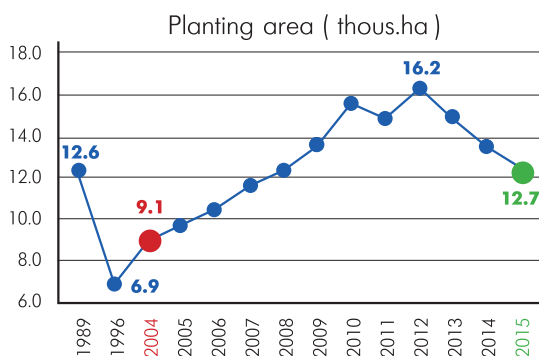
POTATO PRODUCTION (TONNES)

The Mongolian Potato Programme has significantly contributed to the development of Mongolia's potato sector.

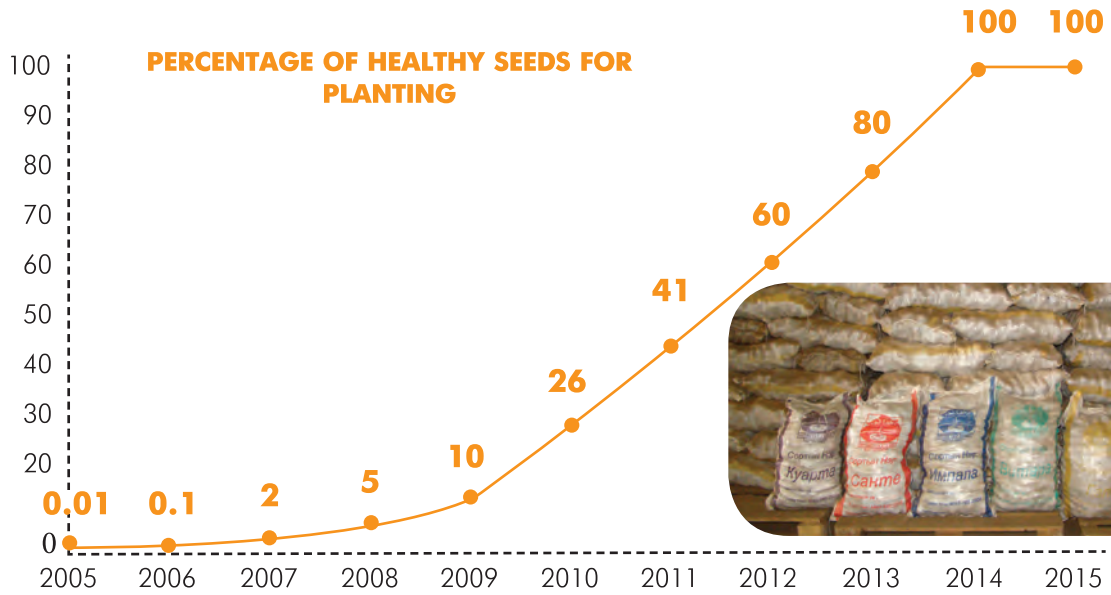


The programme has been implemented nationwide and has reached 63'000 farmers, benefiting all Mongolians. The sector is now able to fully meet the domestic demand for potatoes, rising from 55 percent to 100 percent.

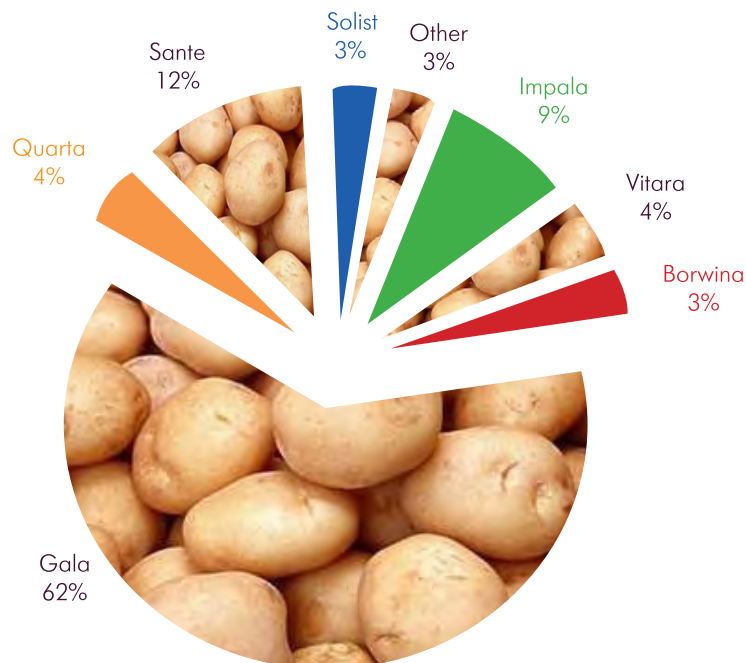
POTATO PLANTING AREA AND TOTAL YIELD



Potato production in Mongolia developed intensively from 1958. In 2004, when the programme was launched, Mongolia harvested a total of 80'200 tonnes of potatoes from 9'100 ha of planting areas. In 2012, 242'700 tonnes of potatoes were harvested from 16,200 ha and in 2015, 165'300 tonnes were harvested from 12'700 ha.



THE AVAILABILITY OF HEALTHY POTATO SEEDS FROM PERFORMING VARIETIES CONSISTENTLY INCREASED THROUGHOUT THOSE YEARS, FROM 0 PERCENT TO 100 PERCENT.



SEVEN NEW POTATO VARIETIES HAVE BEEN INTRODUCED

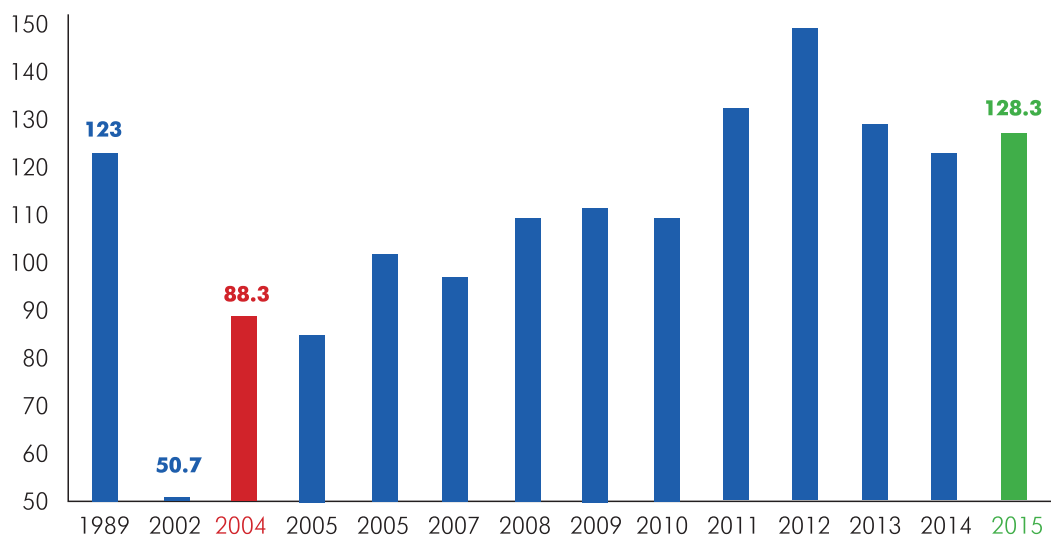
A G-2 potato seed system was introduced, and the elite seed production system was accelerated from four to two years, resulting in a doubling to tripling of yields.

POTATO SEED SYSTEM

Seed	2004 (4 years schema)	2014 (G-2, 2 years schema)
Mini tuber	42'000 pieces	112'000 pieces
1st year multiplication	10 tonnes	-
Super-super elite	30 tonnes	-
Super elite		42.5 tonnes
Elite	250 tonnes	463.5 tonnes
Certified seed	672 tonnes	2'965 tonnes
Farmers saved seed	-	8'000 tonnes



POTATO YIELDS HAVE RISEN FROM 8.8 TONNES/HA TO 12.8 TONNES/HA

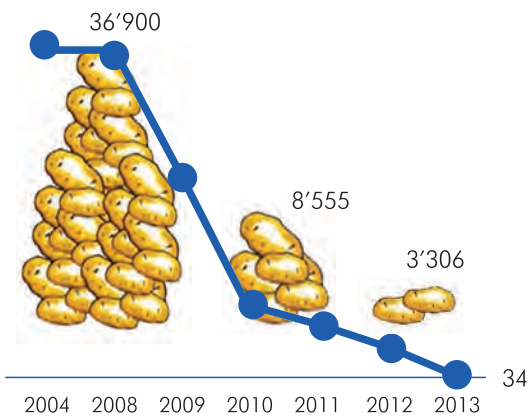


Potato imports fell from 38'000 tonnes in 2005 to 34 tonnes in 2013

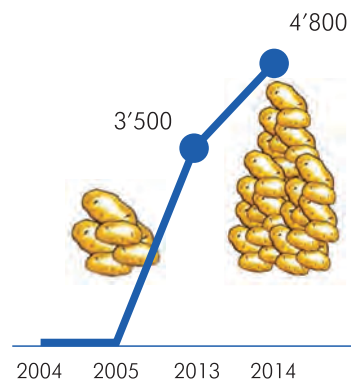
due to increased production and yields.

Potato exports increased from zero in 2005 to 4'200 tonnes in 2014.

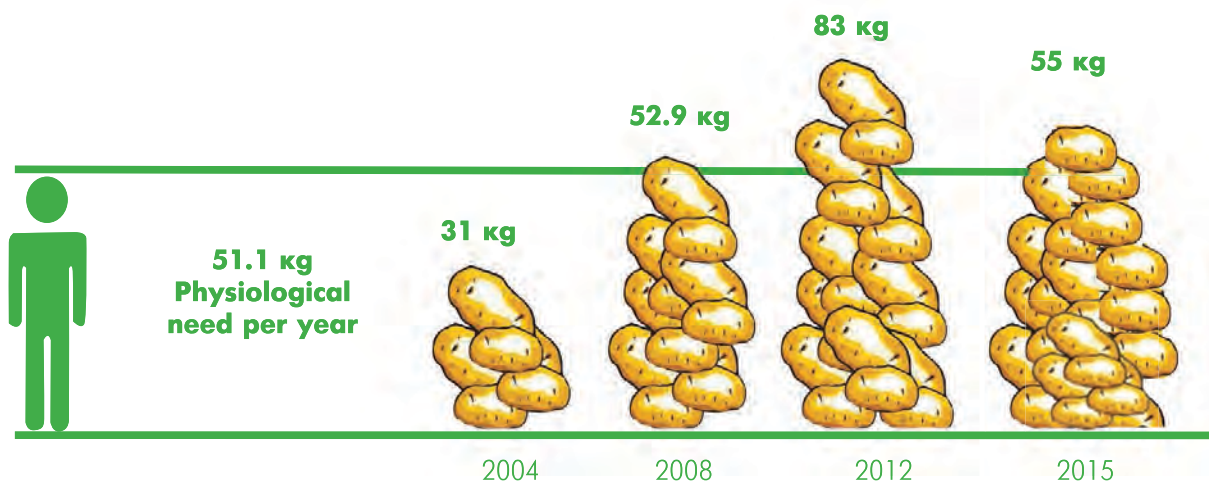
IMPORT (TONNES)



EXPORT (TONNES)



CONSUMPTION PER CAPITA INCREASED FROM 31 KG TO 55 KG

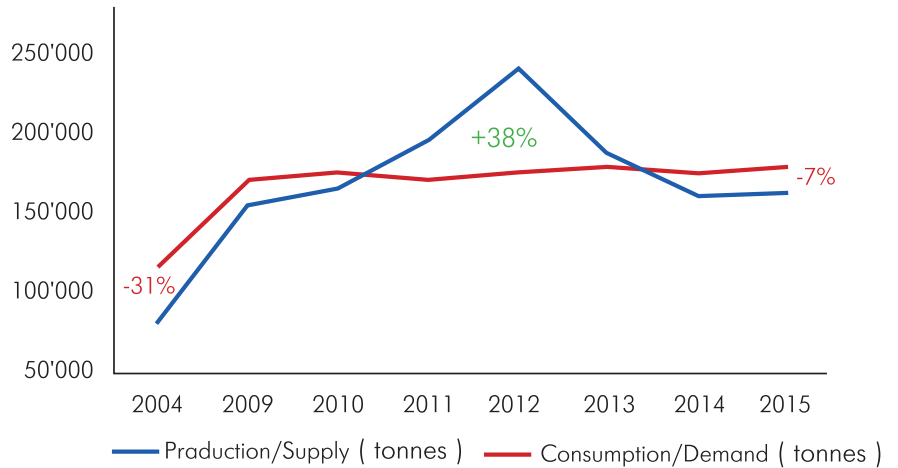


COST-BENEFIT ANALYSIS OF THE MONGOLIAN POTATO SECTOR POTATO MARKET, COST, BENEFIT, RESULT

POTATO MARKET

SUPPLY AND DEMAND 2004-2014

The potato demand in 2014 was more than 93 percent met by domestic production, with imports representing less than 7 percent. A 15 percent import tax has been levied since 2004; however, with the increase in potato consumption, the economic impact of this tax has risen (the domestic price is 5 percent higher, representing a cost for Mongolian consumers).



COST



In terms of the additional costs in the potato sector since the launch of the programme in 2004, the figure shows that farmers are the main contributors followed by consumers (the extra quantity of potatoes paid 15 percent more than the market price).

In comparison, the contributions of the MoFA and SDC appear to be modest. Another way of interpreting these figures is that with a comparatively modest amount, SDC and MoFA have created the framework conditions that have convinced a large number of farmers to invest more in the potato sector. In other words, this money has been well invested.

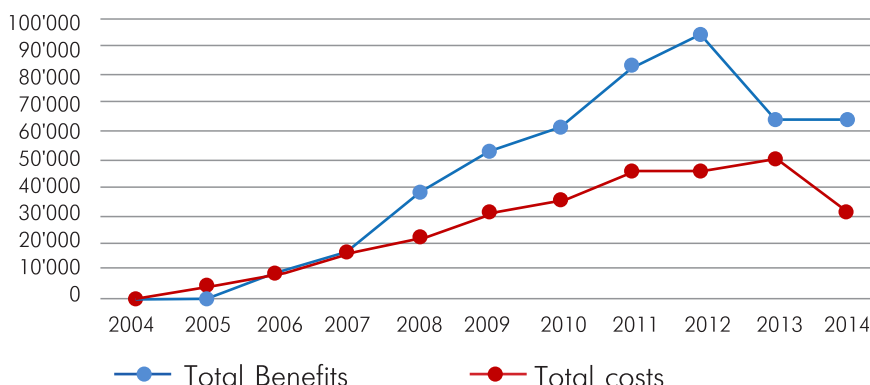
BENEFIT

THE MAIN BENEFIT IS THE VALUE OF ADDITIONAL POTATO PRODUCTION.



RESULTS

COSTS AND BENEFITS - MONGOLIAN POTATO SECTOR 2004 - 2014



The cost-benefit analysis model has a highly positive net present value (discounted at 10 percent), while the internal rate of return exceeds 100 percent.

Sensitivity analysis, for different % of attribution of benefits

Attribution of benefits	100%	70%	60%
Net Present Value 10%	94.7 Billion	19.5 Billion	-5.6 Billion
Internal Rate of Return	110%	39%	-3%

The results of the cost-benefit analysis are positive, and the result is quite solid considering the sensitivity analyses. On this basis, it can be concluded that the Mongolian Potato Programme has been well targeted and has addressed strategic issues within the potato sector. With comparatively small investments, both SDC and the MoFA have

fostered substantial growth in this sector; that is, the programme and the improved framework conditions for potato growing in Mongolia have convinced many farmers to invest in the crop

Source: Cost-Benefit Analysis of the Mongolian Potato Project (MPP), 2004-2014, Dr. Dominique Guenat, 2014

BENEFICIARY ACKNOWLEDGEMENTS


Informal seed multiplier Baymalda Mezemkhan, Bayannuur soum, Bayan-Ulgii aimag:

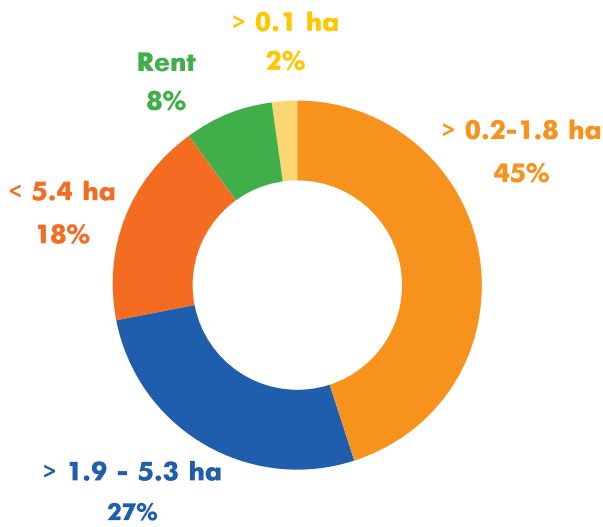
Informal seed multiplier Baymalda Mezemkhan, Bayannuur soum, Bayan-Ulgii aimag: "I'm actually a tractor operator by trade. I have been planting potatoes, cabbages, carrots and turnips since 1991. I plant potatoes on a 1 ha area and vegetables in a total of 0.02 ha I have been in the Mongolian Potato Programme since 2006. I received 500kg of Impala variety potatoes and sowed them on a

1ha area. Between 2007 and 2015, I've harvested an average of 40 tonnes per hectare. I'm very grateful to have joined this programme and renewed my seed deposit. I also gave seed potatoes to 15 people from vulnerable groups in my community. By growing the seeds, I think the families gained at least a bit."

Farmer, Tseveen, Umnudelger soum, Khentii aimag:

My family has five members. Khentii aimag plants more wheat than potatoes and vegetables. In the '90s, the crop sector had collapsed nationwide. By that time we started planting potatoes and vegetables for our own consumption. Once I visited one of my relatives in Ulaanbaatar and delivered one sack of potatoes for their consumption. They were very surprised by the quality of the potatoes we had cultivated because at that time there were mainly imported Chinese potatoes available on the market that were less tested and of less quality. In 2007, we received five sacks of potato seed of the Dutch variety Sante from seed multipliers in our aimag and we harvested almost five tonnes. It was a big success during that period and everyone was surprised and happy with the high potato yield. We understood well the importance of new varieties and new seeds. Today I have three different varieties of farmer-saved potato seeds.

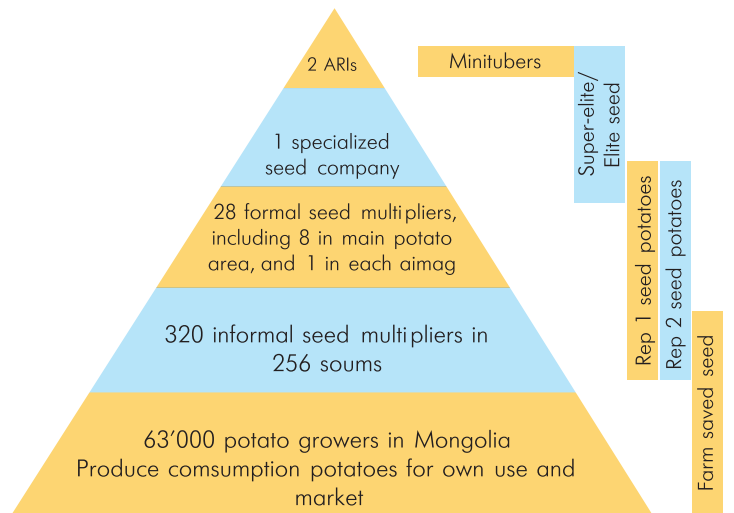




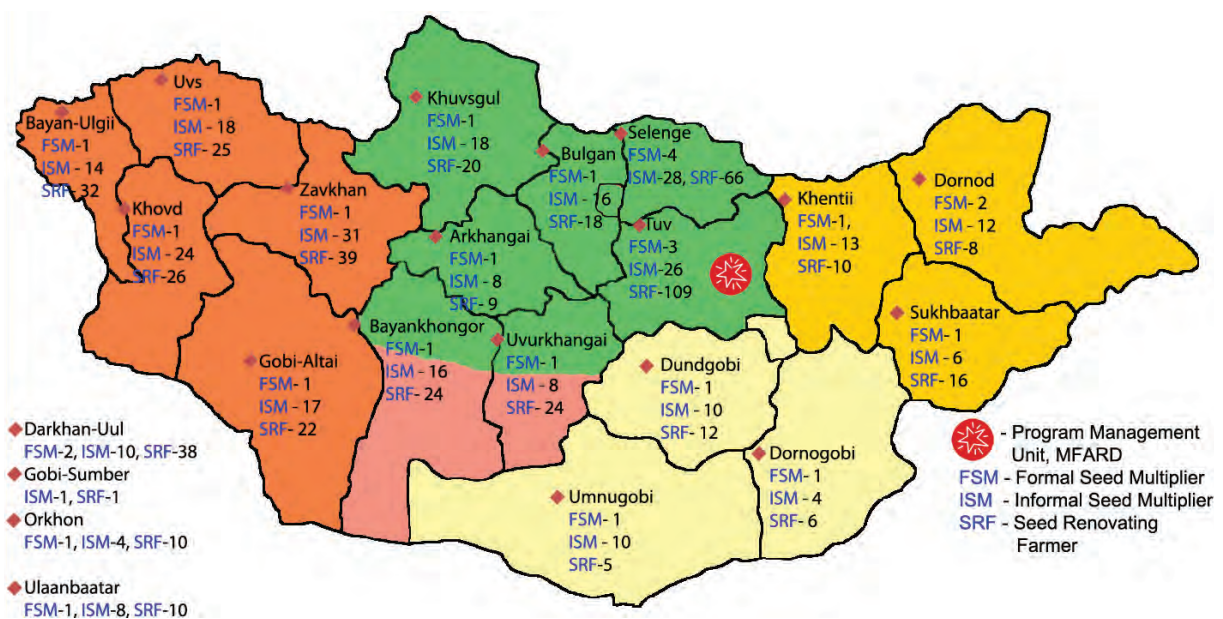
45 percent of the programme's farmer households/beneficiaries cultivated on a 0.2-1.8 ha field

Source: Study results by TERI, 2010

Two research institutes have been producing mini tubers, and one specialized elite seed company, 28 formal seed multipliers and 320 informal seed multipliers are operating in 262 soums of 21 aimags.



POTATO SEED MULTIPLICATION AND DISTRIBUTION NETWORK



STUDIES AND RESEARCHES

The Plant Science Agricultural Research Institute and the Research Institute for Plant Protection have installed an AEROPONIC system and have harvested the first yield of minitubers. Currently, estimated 100'000 minitubers are produced annually.



100 researchers have been trained nationally and internationally.



Nineteen contracted research studies have been conducted by central and regional research institutes and the Mongolian State University of Life Science. The results have been disseminated among farmers.



Chlorpropham, CIPC the most effective post-harvest sprout inhibitor registered for use in potato storage, has been tested and introduced to farmers. With the use of chlorpropham, farmers can increase the storage time for table potatoes by at least three months.

NEW TECHNIQUES, TECHNOLOGIES, APPROACHES, TRAININGS AND PUBLICATIONS

The Mongolian Potato Programme has supported 19 seed multipliers with a total of 800 ha of fields in introducing and using “Dutch technology”.

Potato plant protection chemicals Maxim, Karate zeon, Aktara, Ridomil Gold, Reglon super, Gramoxone, Zontran are tested by RIPP and included in the official list of approved chemicals for the importation.



Eighty farmers with a total storage capacity of 5'000 tonnes, 189 farmers with a total ground-storage capacity of 7'400 tonnes, and 20 greenhouses with a capacity of 2'200 m² were established and renewed with support from the programme. In addition, 100 ger storages with a total capacity of 45 tonnes were delivered to herders.





Local processing technology initiatives have been supported. Six varieties of dried potatoes and vegetables were produced by local farmers and distributed to herders in collaboration with SDC's Green Gold Project.



10 books and 20 handouts were printed, 50 articles were published in newspapers and journals, and four DVDs and CDs were produced.

3'000 farmers and specialists participated in 60 trainings and study tours conducted nationally. 150 farmers and specialists took part in 30 trainings, conferences and study tours internationally.





The Mongolian Potato Programme organized a regional International Potato Center in East, South-east Asia, Pacific region CIP-ESEAP workshop in 2009 with 40 participants from eight countries and 100 participants.



MARKETING

At present, three small-scale factories making French fries and one small-scale factory making chips are operating in Ulaanbaatar. A specialised seed company is producing elite seeds of the Shepody variety for French fries.



There has been a rapid increase in the packaging of potatoes in the past 10 years.



MAIN ACHIEVEMENTS OF VEGETABLE SECTOR

More than 144 new varieties of 34 vegetables species have been introduced for variety testing.

In 2014, the State Variety Testing Commission approved 23 promising new open-pollinated varieties of seven main vegetables and 10 hybrids for cultivation in Mongolia.



The national production of the onion set, which was almost collapsed, had been revitalized since 2012. As of 2015, more than 4'800 kg of Stuttgarter risen variety of the onion set was produced nationwide and more than 25'000 kg of imported onions were supplied to the farmers in order to improve the production level of onions.



Under local initiatives, vegetable seed shops were established in eight soums of five aimags to supply seeds of the main vegetable varieties to farmers at wholesale prices.

The establishment of cabbage seedling nursery centres in seven soums of four aimags has led to increased cabbage production. Cabbage imports have fallen compared with 2014, resulting in MNT 1.3 billion in savings.



150 sets of small-scale vegetable equipment were distributed to seed multipliers and farmers. New pesticides for vegetables were tested, and as a result five new pesticides were officially registered on the list of chemicals for import.



Support was provided for special storages for cabbage mother plants (one), root-crop mother plants (one) and onion sets (four) built in Uvs, Dornod, Selenge and Darkhan-Uul.

GENDER

Gender equality isn't about balancing numbers; rather, it is about allowing men, women, boys and girls to have equal rights of participation. The Mongolian Potato Programme has upheld this principle at all levels.



13♂ + 1♀ or 1♀ + 13♂

FEMALE FARMER'S LEADERSHIP:



In 1999, physician L. Khaltar left her work to become a farmer when her husband was diagnosed with liver cancer. Today she is the head of a cooperative with 49 members, a recognised farmer and a female leader. Khaltar's husband recovered and they now motivate other people to grow potatoes and vegetables. In 2007, Khaltar received 1 tonne of elite seeds and harvested 14 tonnes of potatoes. Since then, she has tested drip irrigation for seed potato production, constructed 30 tonnes capacity seed potato storage with support from the Mongolian Potato Programme, and 70 tonnes capacity potato storage with support from the local development fund. They also purchased a small tractor, and the programme assisted them with a potato planter and harvester. With this mechanised potato equipment they are serving other farmers and their cooperative members. In 2011, their cooperative had a 38 t/ha potato harvest and was named "National Leading Cooperative", and in 2014 was named "National Best Farming Entity".

THE MONGOLIAN POTATO PROGRAMME HAS UPHELD THIS PRINCIPLE AT ALL LEVELS.

STAKEHOLDERS	♀	♂
Minituber producers (researchers)	80%	20%
Elite seed producers	10%	90%
Formal seed multipliers	25%	75%
Informal seed multipliers	40%	60%
Processing factories		
Small scale	100%	0%
Large companies	50%	50%
Staff of Mongolian Farmers Association for Rural Development NGO	30%	70%
Farmers		
Managers	10%	90%
Workers	50%	50%
Workers of crop sector	56%	44%
TOTAL	45%	55%





SECOND PART

PARTNERS AND IMPLEMENTING TEAM



TEAM OF MONGOLIAN POTATO PROGRAM IMPLEMENTATION UNIT



S. Ganbaatar



T. Ariunjargal



O. Tzolmonkhuu



N. Bat-Erdene



L. Munkh-Od



Ch. Suvd



B. Orgil



Ch. Tungalag



T. Turmandakh



Ch. Amarjargal



TEAM OF MONGOLIAN FARMERS ASSOCIATION FOR RURAL DEVELOPMENT NGO



G. Davaadorj



L. Ganbaatar



G. Amarjargal



M. Nergui



S. Nyamjav



B. Zolzaya



M. Nomingere



J. Byambadorj



G. Ganbaatar



Claudio Köhler

SDC NATIONAL PROJECT OFFICERS & PROGRAMME DIRECTOR



S. Durzijaibuu



A. Amgalan



N. Anandsaikhan



Ts. Batzaya



B. Erdenebileg

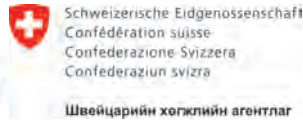


Daniel Valenghi



G. Baigalmaa

PARTNERS



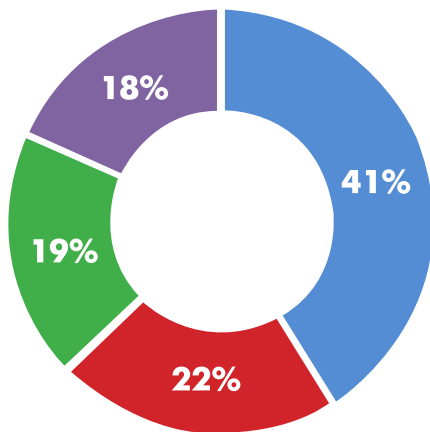
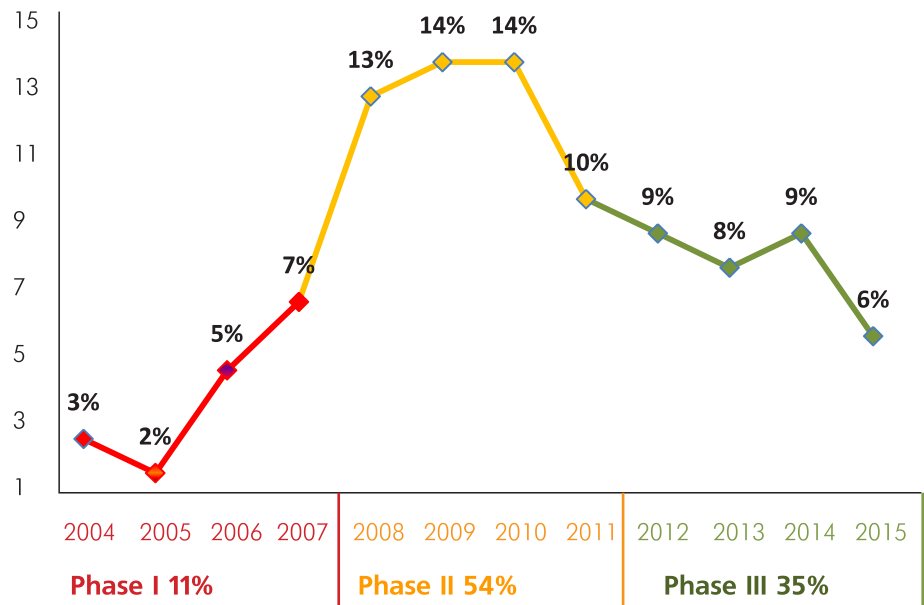
„Meo Voto”



FINANCE

Total programme funding is CHF 8.5 million (about MNT 16.5 billion) from 2004 to 2015.

FUNDING DISTRIBUTION 2004-2015



TOTAL EXPENDITURE:

- 41 percent for hardware
- 22 percent for software
- 19 percent for implementation
- 18 percent for management

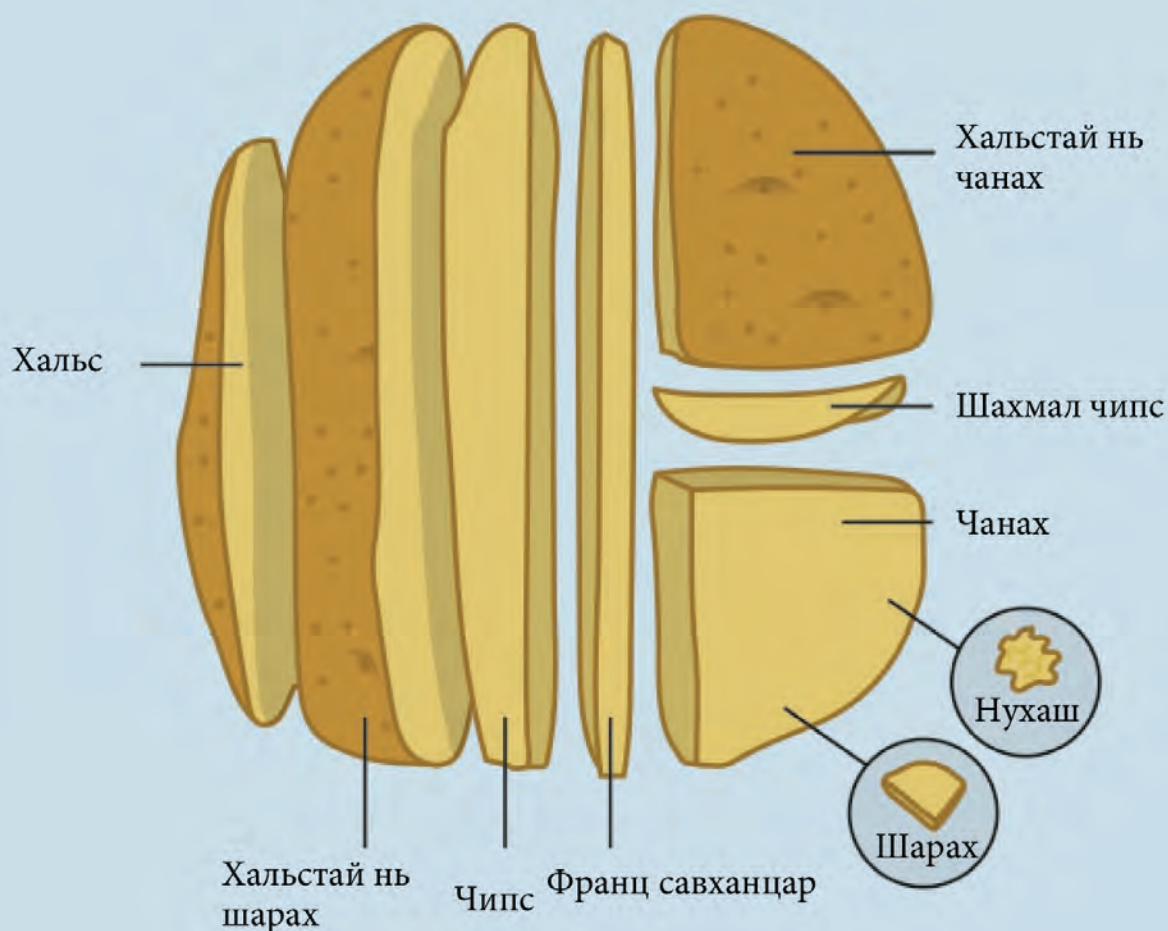
- Hardware (equipment, construction etc)
- Software (training, capacity building)
- Implementation
- Management



INTERESTING FACTS ABOUT POTATOES

TӨМС

Хэрэглэх сонголтууд



INTERESTING FACTS ABOUT POTATOES

Potato is Mongolia's second staple crop after wheat in terms of the scale of production and food value. Potatoes are also called the "second bread".



IN 1000

Potato first cultivated in Chile and Peru



IN 1570

Spanish explorers bring the potato to Europe



IN 1845

Potato crop blight causes the Great Hunger in Ireland 1 million people die in six years



IN 1957

First factory of frozen and fried potato launched in Canada



IN 1942

First variety testing research started in Mongolia



IN 1900

Potato started planting in Mongolia



IN 1995

The potato becomes the first vegetable grown in space



IN 2004

Mongol Potato Program started



IN 2008

International Year Of Potato

HEALTH AND BEAUTY EFFECTS OF POTATOES



The high potassium volume (568 mg per 100g) of potatoes helps increase metabolism and rid the body of surplus water and salt. The potassium content is highest when boiled, and is good for people suffering from chronic kidney illnesses, heart failure and gout.

Potatoes are also recommended for people with stomach ulcers and gastrointestinal disorders.

Potatoes also have a high protein composition and are beneficial for people suffering from stomach acidity and heartburn.

The starch in potatoes decreases the level of cholesterol in the blood, which means it is beneficial in cleaning blood vessels.

Gargling with potato juice three times a day helps to prevent periodontitis or the loosening of teeth from gums.

IN HOMEOPATHY

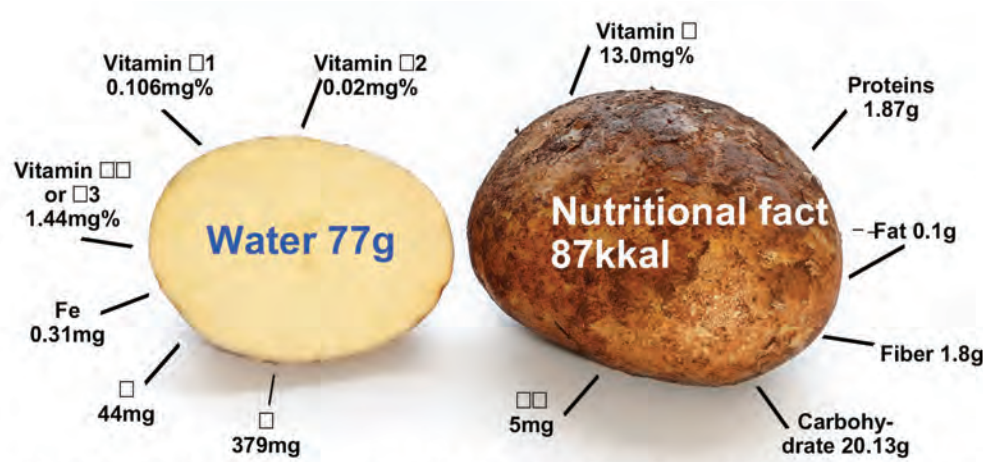
Raw potato is applied to burns, eczema, fungal infections and areas where there is arterosclerosis and joint pain to relieve itching and pain. The same method is also recommended for foot corns, callouses and injection scars.

Breathing the steam from boiled potatoes is also helpful for flu, nasal indigestion, laryngitis and sore throats. Eating boiled potatoes may also help to alleviate the symptoms of food poisoning.

BEAUTY BENEFITS OF POTATOES

A whole boiled potato, half a teaspoon of honey and half an egg white can be mixed and applied to the neck as a mask for 20 minutes.

Mashed potatoes mixed with vegetable oil can be used as a mask for people suffering from sunburn and dry skin.



Also contain other vitamins such as A, D, E, K, folic acid, and organic acids as malic, oxalic, citric, caffeic and chlorogenic.

SPECIFICATION OF POTATO VARIETIES



IMPALA

Deep yellow flesh and early variety for fresh consumption: soup and frying.



VITARA

Deep yellow flesh and medium early variety for fresh consumption: frying.



SANTE

Pale yellow and medium variety for fresh consumption: frying and salad.



GALA

Deep yellow flesh, medium early and very delicious variety for fresh consumption. Very delicious and testy variety.



SOLIST

Pale yellow flesh and early variety for fresh consumption.



QUARTA

Deep yellow flesh, medium early and very delicious variety for fresh consumption: mashed potato.



Rösti: Quintessentially Swiss

Serves 4:

Ingredients

- 1.2 kg large waxy potatoes
- 3 tablespoon butter
- 2 teaspoon salt
- 10 twists of pepper

Switzerland is famed for its stability, direct democracy, mountains, watches, chocolate and, of course, rösti. At glance, rösti may seem like a rather humble, unsophisticated peasant dish. But do not be fooled by appearances. Underneath its modest exterior lies a wealth of creativity and innovation, much like Switzerland itself. Rösti – or roesti, as it is written in French – is a fried potato cake originally from German-speaking Switzerland. Although the term “Rostigraben” (rösti ditch) refers to the cultural fault line that divides French-and German-speaking Switzerland, the dish is a much-loved national culinary treasure.

Switzerland does not have the monopoly on fried potato dishes, though. For example, the United States has hash browns, while in Spain there is “patatas a lo pobre”. However, what sets Switzerland apart is that it invented a special potato grater specifically for rösti. Since its arrival towards the end of the 19th century, the rösti grater has propelled this simple potato cake into the ranks of Swiss ingenuity.

The potato may be the star ingredient in this traditional Swiss specialty but it serves as a stark reminder that Switzerland was not always the prosperous land it is today. It was thanks to the humble tuber that the country staved off several famines. Legend has it that in 1770 the potato was re-christened the “savior of the poor”.

Rösti

Rösti is a dish made from cooked or raw potato which can be eaten either on its own or as a side. When served as a main course, it comes in many

varieties, with additions such as vegetables, cheese, mushrooms and diced meat. Served plain, rösti is the perfect accompaniment to fish, sausages, stews, and other meat dishes.

Preparation

- Parboil the potatoes in their skins for around 40 minutes until tender, but not soft. Peel the potatoes while they are still warm, then store in a cool place overnight.
- Grate the potatoes with a rösti grater, keeping the strands as long as possible.
- Heat the butter in a large non-stick frying pan. Add the grated potatoes, season with pepper and salt, and gently stir through.
- Using a wooden spoon, press the sides of the potato cake as lightly as possible to form an attractive dome-shaped cake.
- Cook the rösti for around 10 minutes on each side, or until a golden-brown crust forms.

Twips and ideas

All additional ingredients like onions, bacon and fresh herbs should be added to the cold grated potato mixture.

Never move or stir the grated potato once it is in the frying pan as the mixture will become too starchy.

The time it takes to brown the rösti depends on the water content of the potato you use. Potatoes with high water content may take more than 10 minutes in the frying pan before a golden-brown crust forms.

Bon appé'tit

TIPS FOR POTATO PLANTING IN THE HOME GARDEN/BACKYARD

Preparing fields: Fields should be watered to a depth of 24-30 cm 3-4 days before sowing. 4-5 kilograms of manure per square metre should be applied equally on the surface of fields, then dug 22-25 cm deep in lines and level with the muckrake.

Preparing seed plantation: 30 days before sowing, tubers should be placed inside a plastic bag and situated in a sunny area for 48-72 hours to enable the potato eyes to open. They should then be placed in a less sunny area, on a haystack, to enable the eyes to sprout. At night or on cold days, tubers should be covered with a blanket. The tuber with the size of a hen's egg, weigh 40-100g, have a healthy pink-tinted colour and 0.5-1.0cm long sprout, they are ready to be planted.

Planting: Potatoes can be planted in two ways: In hilled rows or in checkered rows. Planting is done from May 5-20. Potatoes should be planted 70cm apart and 20-25cm deep. For raised hills, seed potatoes should be planted 25-30cm apart and 8-10cm deep. After planting, soil should be shoveled from between the rows, made dense and watered.

Care:

- After planting, fields should be cleared of weeds and muckraked for about 10 days. This can be done by hand.
- When potato shoots have reached a height of 15-20 cm, the soil between the rows should be tilled by raking soil from the bottom to the mounds. When the shoots reach 30 cm, 1/3 of each stem should be buried under soil, which is called the first hilling. When potato plants begin to form and the stems in rows reach each other, a second hilling is applied by covering half of each stem with soil. The last refining of the distance between rows should be done before August 5; after this, the soil should not be disturbed to ensure that tuber growth is maximized.
- During the growing, compost fertilizer should be diluted with water at a ratio of 1:10 and applied at the rate of 10 litres per square metre.

Harvest: It is time to harvest when the plants' stems and leaves are completely dry, when the tuber skins have hardened and when it's late and cool in autumn, usually from September 10-25. Harvesting should be done in such a way that digging will not harm the tubers; the shovel should be leveraged to extract the whole plant. The soil is then cleaned and the potatoes are retrieved.

Storage: Following the harvest, the tubers should be sorted and dried, stored in a pit or a heated cellar under the house. The storage area should have 85-90 percent relative air moisture and be +1-+3°C in temperature.



Have a high yield

TIPS FOR PLANTING ORGANIC POTATOES

Preparing fields and fertilising: When choosing organic potato fields, opt for an ecologically healthy location that is far from urban and industrial areas where there is no chemical, air and water pollution. When potatoes are repeatedly planted in one area, pests increase and crops decrease. Therefore, rotating fields with onions and buckwheat, which improve soil health, is recommended. The following organic fertilisers can be used for fertilisation:

Fertiliser name	Compost manure	Bio-compost	Gumat 7B	Azophos liquid bacterial fertiliser
Amount required (per 1 ha)	30-40 tonnes	1-2 tonnes	2-3 litres	150 litres

Preparing seeds for plantation: Before planting, 1 tonne of seeds are treated with 2 l/tonne of Bactofit, a seed-treatment bio-fungicide, or a Baigal 2M solution with a dilution ratio of 1:100. The seed potato should be between 40-80g or a little larger than a hen's egg in size.

Planting potatoes (sowing seeds): As stated previously, potatoes can either be planted in rowed hills or in checkered rows. When the field temperature reaches 7-8°C, from May 5-20, seeds should be planted at a rate of 3 tonnes/ha at a depth of 8-12 cm. The ideal distance should be either 70x30 cm or 72x25 cm.

Care: After planting, particular care should be taken in soil loosening, weeding, pest control, and maintaining optimal nutrition and moisture, in that order.

- Because herbicides can't be used for organic potatoes, weeds should be managed mechanically. Depending on the spread of weeds, the cleaning of weed shoots should begin within 10 days of planting.
- When potato stem reach a height of 15-20 cm, the tilling of the distance between rows

should be done. When stems reach 30 cm, the first hilling should be applied. When potato plants begin to form, the second hilling is applied before the rows closed. At every stage, weeds should be removed.

- For pest control, the bio-insecticide "Bitoxibacillin" should be sprayed at a rate of 2-3 kg/ha. In the case of diseases, Bactofit bio-fungicide should be sprayed at a rate of 2 l/ha, or "Phytopsporin M" bio-fungicide at a rate of 2-3 kg/ha either once or twice.
- During the growing phase, manure or compost liquid should be prepared, manure should be diluted at a ratio of 1:10 and compost diluted at a ratio of 1:15-20 and then applied at a rate of 10 litres per square metre. Gumat-7B fertiliser should be used in 2 l/ha dosages

Harvest: Harvest begins in the cool autumn period when plants' stems and leaves have dried and tuber skins have hardened. If stems and leaves green, the harvest should be done seven to 10 days after the first frost falls, after the stems and leaves have cutted.

Storage: After harvest, the tubers should be sorted, dried and stored in a pit or a heated cellar under the house. Fifteen to 20 days before placing the tubers in the cellar, the storage area should be cleared of moisture via a smouldering fire. Potato storage should follow the norm of 15-18°C of warmth for 10-15 days, and following the treatment period the temperature should gradually be reduced. The storage area should have 85-90 percent relative air moisture and be +1-+3°C in temperature.



Details and professional advice are available at the Mongolian Farmers' Association for Rural Development. Phone: 11-464132