



SECTION 1 FACT CHECK POTATOS

The potato is a popular side dish for many dishes in European cuisine. Plump early potatoes are also available in winter. They come from southern Europe, Israel and also from Egypt. Do we really need the desert potatoes or should we limit ourselves to regional stock?



Nicola variety

Potatoes are one of the staple foods. Around 360 million tons are harvested worldwide every year. In Germany, 60 kilograms of the power tuber are consumed per person per year. Around half of the total consumption is in the form of processed potato products such as potato salad or pancakes, French fries or potato chips.

The potato and its image problem: In 1950, per capita consumption in Germany was still 186 kg. International products and recipes changed the eating habits of Germans, and side dishes such as rice and pasta became increasingly important. The aim is therefore to counteract the potato's staid image by offering more variety. In addition, the potato fits perfectly into the requirement profile for the trend of regional foods with a great preference for organic cultivation.

The **composition of potato ingredients** varies depending on both environmental conditions (soil, climate) and cultivation techniques (fertilization, plant protection). The physiological calorific value is 297 kJ (70 kcal) per 100 g of edible portion. Potatoes consist of almost 80% water and 15% carbohydrates (mainly starch with very small amounts of sucrose, glucose, fructose). They provide 2% dietary fiber, 2% high-quality protein, numerous minerals and vitamins. Waste (skins) accounts for 20% of 100 g of raw potatoes.

As for their eco-balance....

A direct comparison between potatoes from regional cultivation and imported goods from subtropical cultivation areas shows: The production of potatoes

- requires nutrient-rich farmland and constant soil moisture.
- the water requirement is moderate with 135 L per m² in regional cultivation, the rain provides enough
- in desert regions, it increases threefold. There, the evaporation rate is up to 70 %.

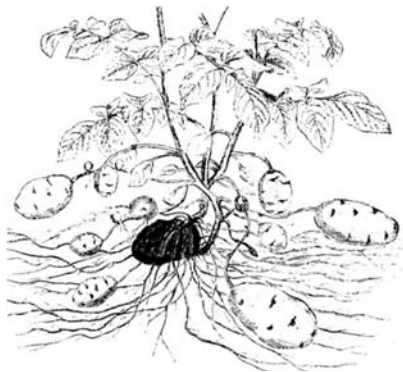
Compare the tables in DATA SHEETS WS 3+4. The values come from studies by the Water Footprint Network, Öko-Institut & Statista. Other sources include work by Mekonnen & Hoekstra (2010) and Poore & Nemecek (2018).

TASKS:

Gather further information on the potato crop in order to complete tasks 1-4. You can get started by using www.faostat.org or WIKIPEDIA at <https://en.wikipedia.org/wiki/Potato>.

1. In which countries are potatoes produced? What is the production volume in tons? Uses the world map
2. Describes the growing conditions. Are fertilizers and/or pesticides used?
3. Who exports potatoes? Describes the world trade.
4. What is made from potatoes? Outlines the technical process for the production of French fries.

SECTION 2 DATA SHEET (characteristics of water consumption)

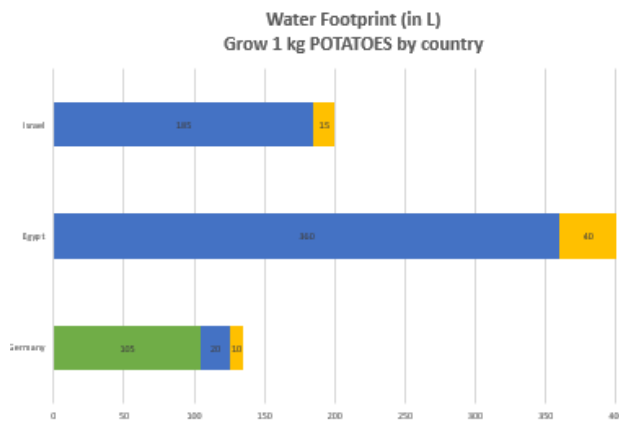


Lower part of the potato plant: the mother tuber is dark marked

Once the soil temperature is at least 8 ° C, potatoes can be planted. To promote tuber formation, a maximum night temperature of 15 ° C is required. Tubers grow optimally at soil temperatures of 15 to 18 ° C. If temperatures drop below 10 ° C or rise above 30 ° C, the plant nearly stops growing. Cultivated potatoes are divided into early (90 to 120 days), medium (120 to 150 days) and late (150 to 180 days) varieties.

Requirements for the irrigation of potatoes: The cultivation of potatoes is fundamentally problematic with regard to the increased risk of soil erosion by water. In Germany, potato cultivation manages almost without artificial irrigation because enough rain falls. The production of 1 kilo of potatoes requires 135 L of water.

And the potatoes from the desert? In the open field, the soil must be kept moist even before planting; during the growing season, sprinkler systems drive over the fields under a scorching sun and spray the greenery with deep water. In Egypt, therefore, about 400 L of water are needed per kilo of tubers. The moisture also favors infestation of the plants by pests (potato blight, Colorado potato beetle), which must be combated consistently. In the greenhouses in Israel, on the other hand, only half that amount is needed because effective but labor-intensive drip irrigation systems are mostly used.



Water Footprint Grow 1 kg	water source			total (L)
	green (L)	blue (L)	grey (L)	
Germany	105	20	10	135
Egypt		360	40	400
Israel		185	15	200

The potatoes harvested in Germany are stored in large halls in a cool, dry place until they are sold. Advances in refrigeration technology - in terms of energy supply and ventilation - ensure excellent quality of the stored goods all year round.

In mild growing regions from the Palatinate to Thuringia, pre-sprouting of seed potatoes from January/February allows potatoes to be planted as early as March and sold as early potatoes from May/June.

TASKS:

5. How much is 1 kilo of early potatoes?
6. What are the consequences of this information with regard to sustainable consumption?
7. Find out about potato blight in Ireland.

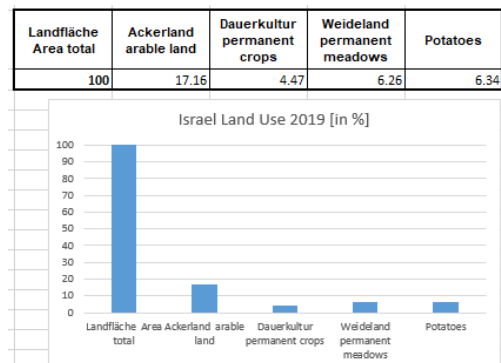
SECTION 3 DATA SHEET (Characteristics of land consumption)

Land consumption of potatoes from regional cultivation & imported goods in comparison 2019/20 In the producing countries, potato fields require land, which is indicated in the table. The reference for an agricultural area is hectares (ha). 1 ha is 10,000 m² (for comparison, 1 soccer field has an area of 7,140 m²).

data 2019/20, www.faostat.org		Landuse in 1.000 ha				
Land Country	Bezugsgröße Allocation	Landfläche Area total	Ackerland arable land	Dauerkultur permanent crops	Weideland permanent meadows	Potatoes
Brazil	in [ha]	851.577	55762	7756	173361	117
	in [%]		6.55	0.91	20.36	0.014
China	in [ha]	959.696	119513	16206	392834	4218
	in [%]		12.45	1.69	40.93	0.44
Egypt	in [ha]	100.145	2911	925		179
	in [%]		2.91	0.92		0.18
Germany	in [ha]	35.759	11714	200	4751	277
	in [%]		32.76	0.56	13.29	0.77
India	in [ha]	328.726	156416	13000	10258	2158
	in [%]		47.58	3.95	3.12	0.66
Israel	in [ha]	2.238	384	100	140	142
	in [%]		17.16	4.47	6.26	6.34
Italy	in [ha]	30.134	6723	2437	3245	47
	in [%]		21.69	8.09	10.77	0.16
Latvia	in [ha]	6.459	1319	9	632	8.5
	in [%]		20.42	0.14	9.79	0.14
Poland	in [ha]	31.270	11055	340	3128	226
	in [%]		35.35	1.09	10	0.73
Russian Federation	in [ha]	14.452.664	121649	1793	92052	1178
	in [%]		0.84	0.012	0.64	0.008
South Africa	in [ha]	122.104	12000	413	83928	68
	in [%]		9.83	0.33	68.74	0.056
Spain	in [ha]	50.597	11884	4886	9413	65
	in [%]		23.49	9.66	18.6	0.13
USA	in [ha]	982.668	157737	2700	245374	370
	in [%]		16.05	0.27	24.97	0.04

TASKS:

- Views the data on agriculture and production of the producing countries. Evaluates them graphically. Use the data set in Excel or Numbers.
- The ratio of arable land to the total area of a country is 1:2 on average. Why is that? What is the situation like in Russia and Egypt? Use the world map and Google Maps to find out.
- Looks via Google Earth and describes the growing areas for potatoes in a selected country.



SECTION 4 GROUP DISCUSSION - PANEL OF EXPERTS

POTATO: Production figures and yields per hectare compared in 2019/20 Potatoes have a firm place in German households. Even in winter and spring. Where do they come from, how are they produced and what area do the fields require? How efficient is cultivation in the producing countries?

data 2019/20, www.faostat.org		Potatoes - Production and Yield					
Country / Allocation	Country Area in [1.000 ha]	Area harvested		Production in [t]	Yield		
		in [1000 ha]	in [%]		hg/ha	kg/ha	t/ha
Brazil	851.577	117	0.014	3767769	321337	32134	32.1
China	959.696	4218	0.44	78236596	185474	18547	18.5
Egypt	100.145	179	0.18	5215905	292031	29203	29.2
Germany	35.759	274	0.77	117151000	428340	42834	42.8
India	328.726	2158	0.66	51300000	237720	23772	23.8
Israel	2.238	142	6.34	498868	351712	35171	35.2
Italy	30.134	47	0.16	1434650	302988	30299	30.3
Latvia	6.459	9	0.14	181100	213059	21306	21.3
Poland	31.270	226	0.73	7848600	347683	34768	34.8
Russian Federation	14.452.664	1178	0.008	19607361	166432	16643	16.6
South Africa	122.104	68	0.056	2546996	373257	37326	37.3
Spain	50.597	65	0.13	2051830	313735	31374	31.4
USA	982.668	370	0.04	18789970	507933	50793	50.8

TASKS:

Based on SECTION 1-3, discuss the numbers in this table:

11. Compares acreage with production figures and yields.
12. Produces meaningful graphs via Excel or Numbers. Uses the data set for this purpose.
13. Which producer country operates very efficiently, and which does not?
14. What are the reasons? Collects reasons (climate, soil conditions, water availability, pests).
15. Prepares group findings in a presentation.

Hektogramm pro Hektar
 hg/ha = 1 hg = 100 g = 0,1 kg
 ha = 10.000 m²
 1 km² = 100 ha

Overview of arguments pro / contra potatoes from regional cultivation or from the desert	
Ecological reasons	
Land consumption	
Water consumption	
other	
Health	
World population, hunger	
Allergies	
other	
Economic reasons	