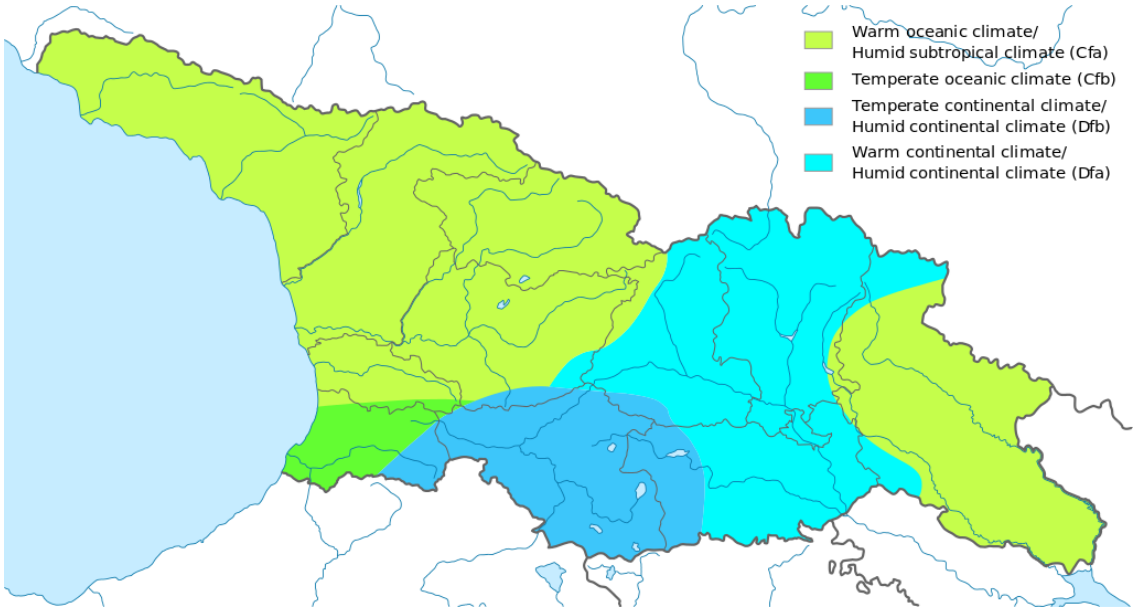
Maize in Georgia: situation and prospects

I A very good climatic potential

Georgia is one of the European countries where maize plays the biggest role in human diet. As it is the case in Italy where the Valley of Po is that of maize eaters ("polentoni") and the southern part that of wheat eaters (the birthplace of the pizza), there are two Georgia: Western Georgia that eats maize as bread ("mchadi") and for the preparation of many meals, and Eastern Georgia where maize is mainly used to feed animals[1].

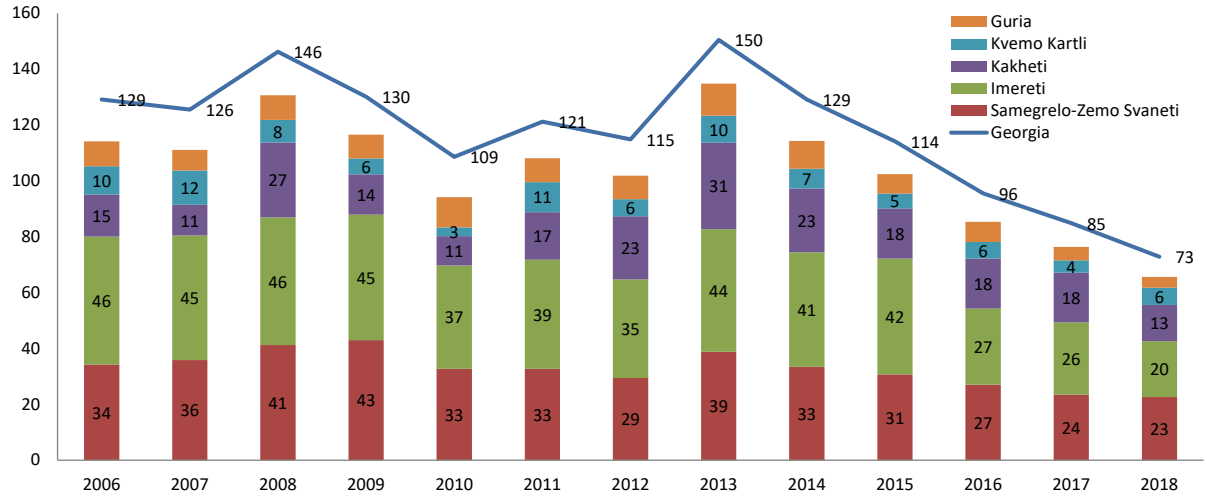
It is usually considered that maize came to Western Georgia in the 17th century, probably thanks to contacts with the Ottoman Empire. In any case, its adoption was so massive and so quick that many Georgians would tend to think that it is an endemic plant and not one imported to Europe after the discovery of America. The quick adoption of maize reflected first the fact that the plant found in warm and humid Western Georgia ideal growing conditions, while this wet climate was poorly suited to wheat and barley.



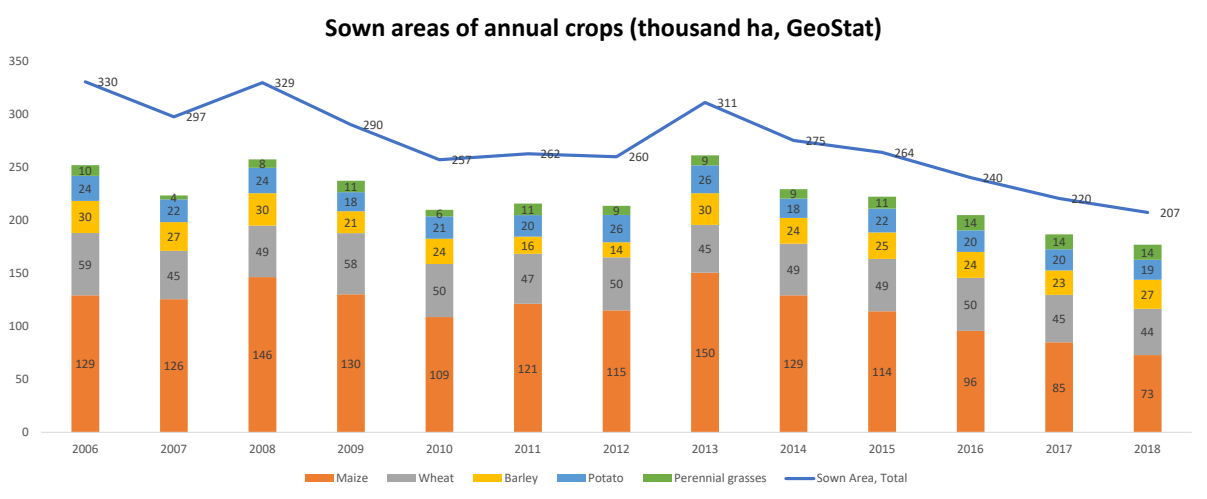
[1] https://folkways.today/mchadi-georgia-corn-bread/

Even though its acreage dedicated to maize has largely contracted in the two last decades, Western Georgia and its large alluvial plain remains the heartland of maize in the country. Samegrelo, Imereti and Guria accounted in 2018 for 67% of total acreage. Another leading region is Kakheti, at the extreme east of the country, where maize finds in the irrigated Alazani valley very good conditions to grow. In this warm area, it is possible to plant maize as a second crop and to obtain two crops a year.

Sown area of maize by regions (thousand ha, GeoStat)

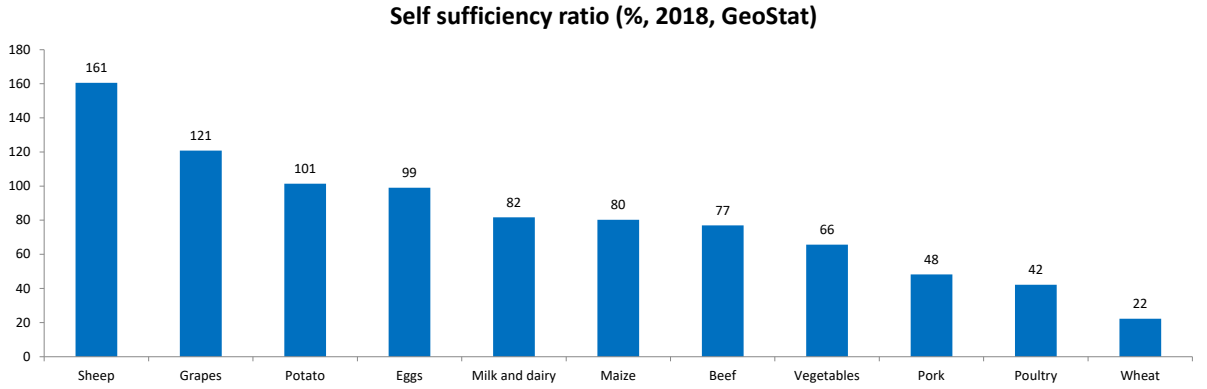


Because of these climatic factors, maize is the first crop cultivated in Georgia, even though its total acreage contracted from 129 thousand ha in 2006 to 73 thousand ha in 2018.

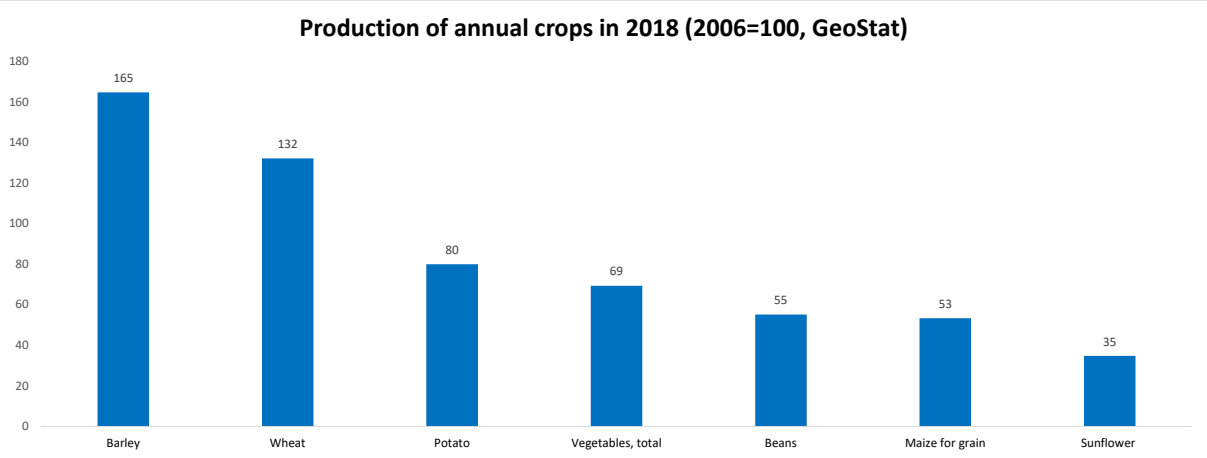


II Recent evolution of maize production in Georgia

Despite its climatic comparative advantages, Georgia is a net importer of maize with only 80% of its demand covered by local production.

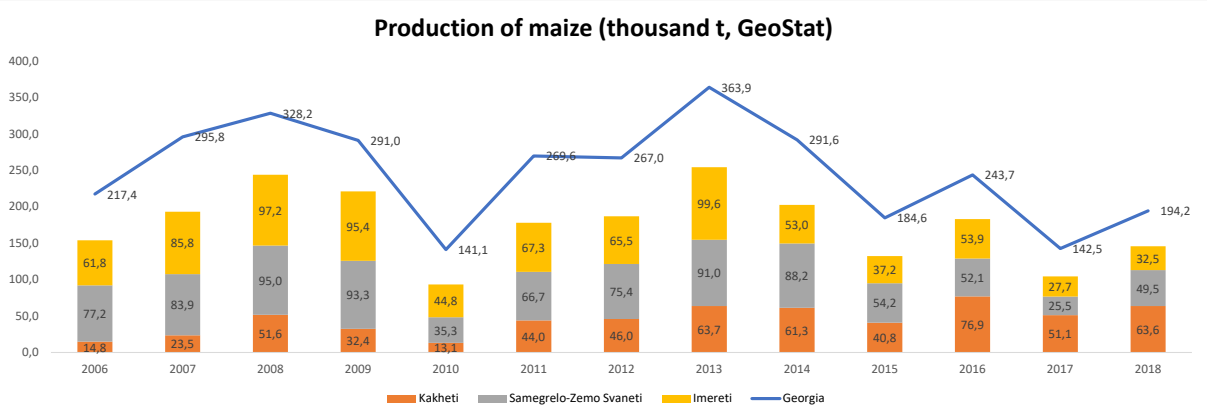


Sure, the self-sufficiency ratio for maize is much better than for wheat for which Georgia is massively dependent on imports. But the evolution of its output has been negative. Between 2006 and 2018, while output for barley increased by 65% and of wheat by 32%, output for maize contracted by 47%.



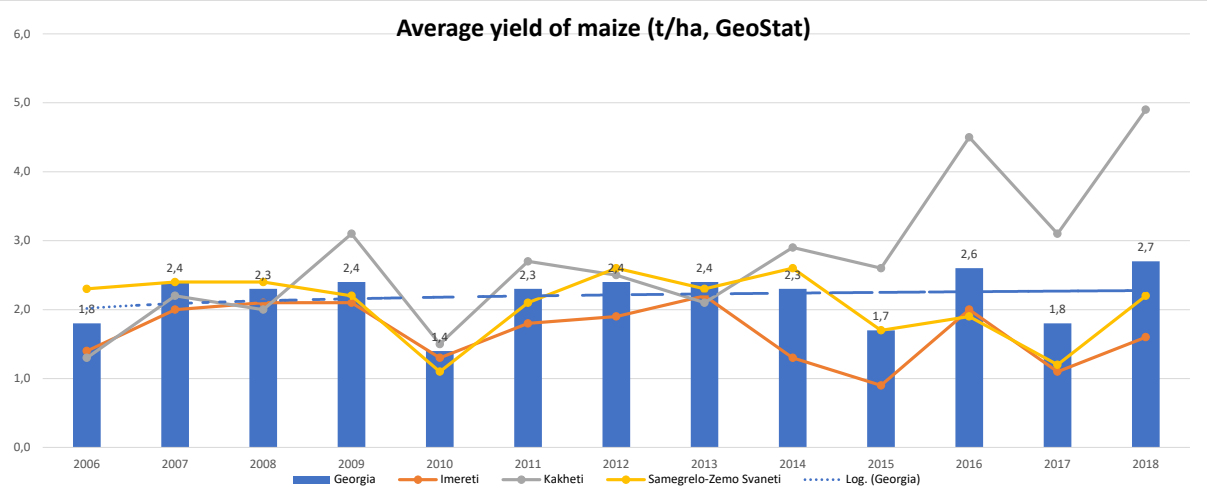
In 2019, according to latest ITC figures, Georgia imported 104,298 t of maize and had a trade deficit for custom code 1005 maize or corn of USD 17.4 million. Nearly all imports came from Russia (USD 15.1 million bilateral trade deficit) with an average import price of USD 155/t.

Since the Rose revolution in 2003, there have been quite substantial variations in the output of maize. As was the case with nearly all other agricultural productions, the lowest point was in 2010, at a time when Georgian agriculture was left without any external protection (import tariff for maize is 0%) and without State support. Then maize production seriously rebounded, especially in 2013 when many farmers benefited from input subsidies through a large-scale State voucher programme. But as the root causes for poor productivity were not addressed, this rebound did not last long and in 2017 the situation was once again alarming. Since then it has modestly increased.

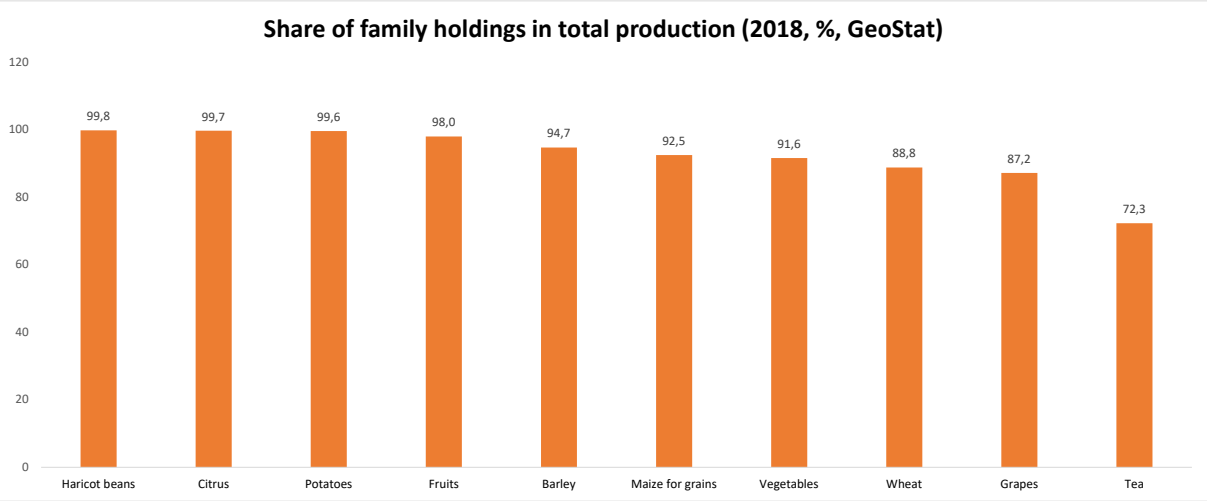


The decrease of production has to be analyzed more in details. There has been on the one hand a substantial fall of output in Western Georgia, but output in Kakheti has been multiplied six times since 2006.

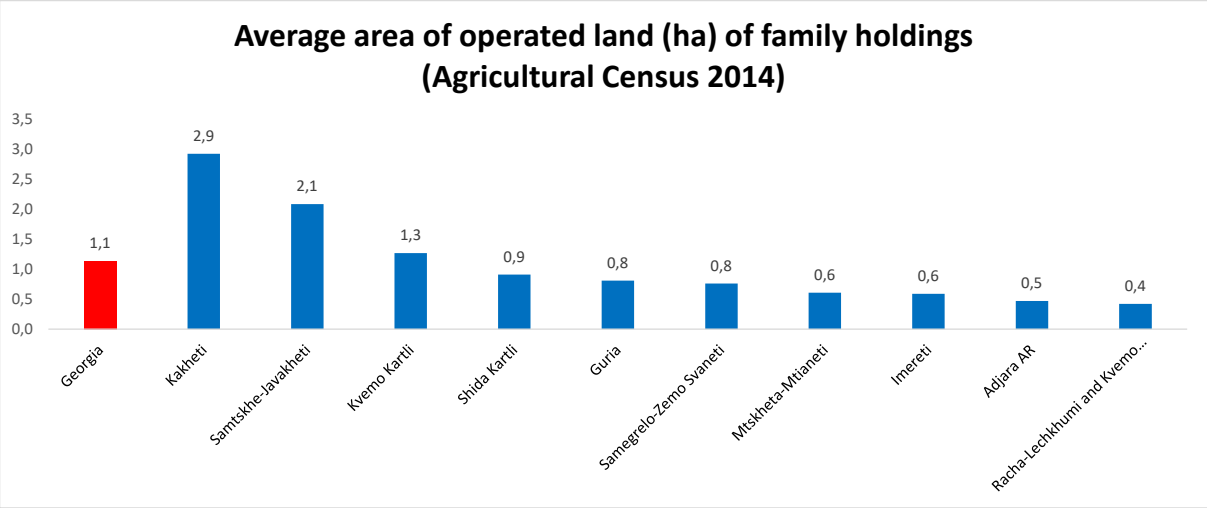
The increase of output in Kakheti is fully linked to that of yields in that region. Despite large inter-annual variations mainly reflecting climatic factors, especially for non-irrigated maize, the upward trend is clearly positive: While average yields in Kakheti were only 1.3 t/ha in 2006, they had reached 4.9 t per ha in 2018. On the contrary, yields in Western Georgia have remained flat or have even slightly contracted during that period.



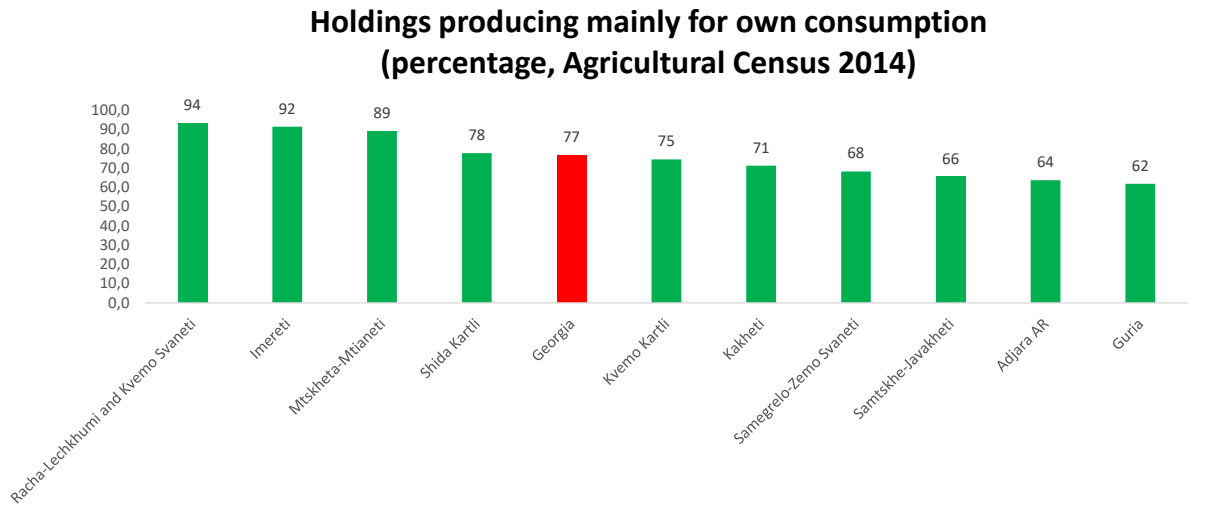
The main reason behind this divergent evolution of yields is agrarian in essence. Today, more than 90% of maize output is produced by family farms as can be shown on the following graphs:



But there is a substantial difference between family farms in different regions of the country: In Western Georgia, family farms are usually micro plots of self-survival agriculture. In Kakheti, farms are larger and usually better integrated in the market. On average, a family farm in that region is six times bigger than in Imereti.



But even in Western Georgia, there are substantial differences in the connection between farmers and the market. While in Imereti 92% of holdings produce mainly for self-consumption, Guria has the lowest ratio (62%) in this field, even less than in Kakheti (71%).



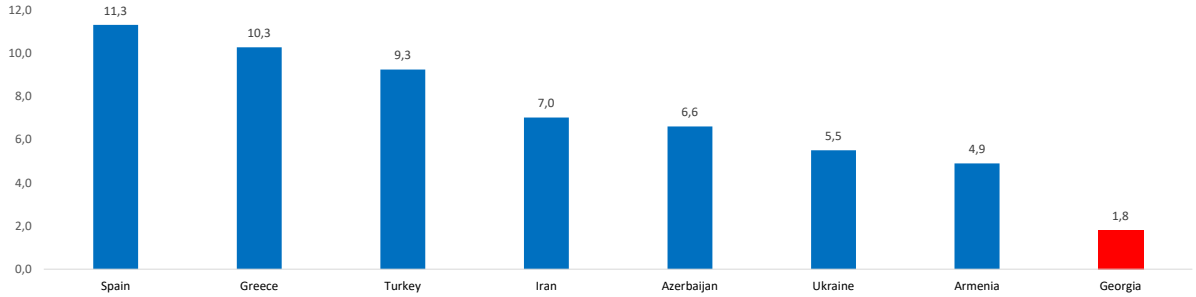
What is clear anyway is that there is massive potential for increase in yields of maize in Georgia if the Kakhetian dynamics can be replicated elsewhere thanks to appropriate agrarian strategies. Even in Kakheti, there is still large untouched potential. Currently yields in that region are roughly similar to those of nearby Azerbaijan, around 5 t per ha. But best producers using hybrid seeds and appropriate technologies achieve 14 t/ha.

III What has to be done at State level?

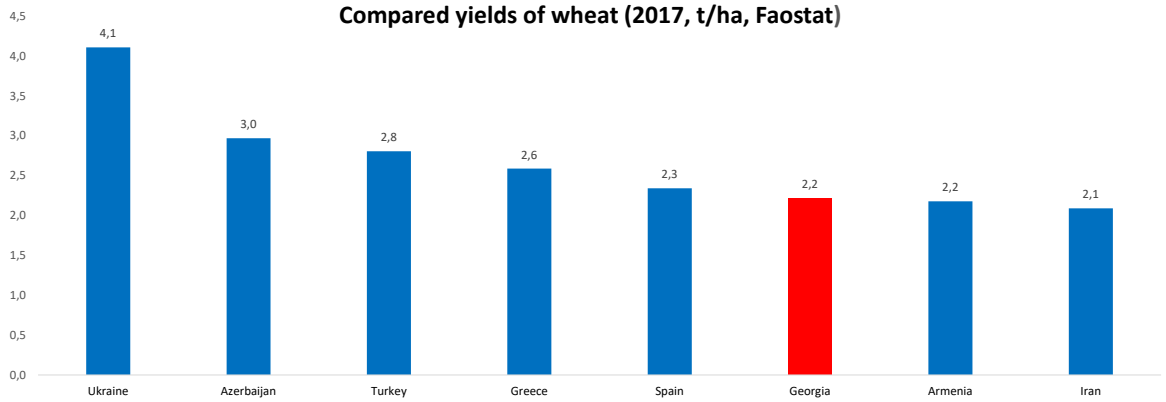
Maize is probably the sector of Georgian agriculture where substantial and sustainable increase in output can be most easily reached in the future.

First of all, because it is one of the sectors for which the yield gap with countries of similar potential is the biggest. If we take Turkey as a benchmark, Georgian yields for maize are only 19% of Turkish ones. For wheat, they currently reach 79% of Turkish yields, and for barley 69%.

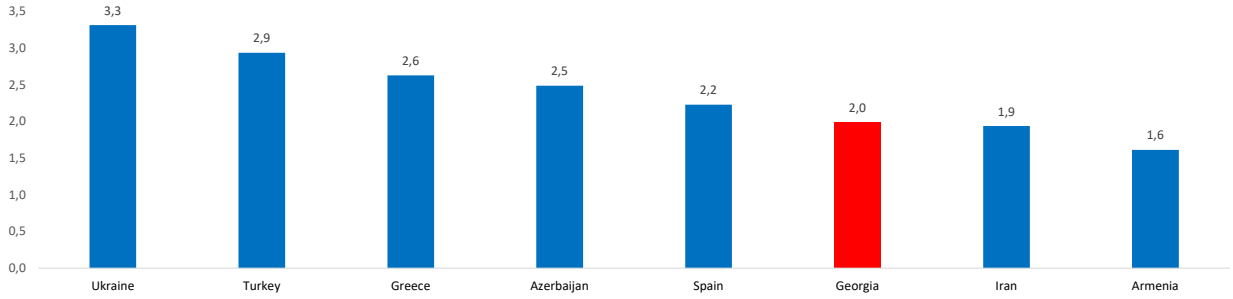
Compared yields of maize (2017, t/ha, Faostat)



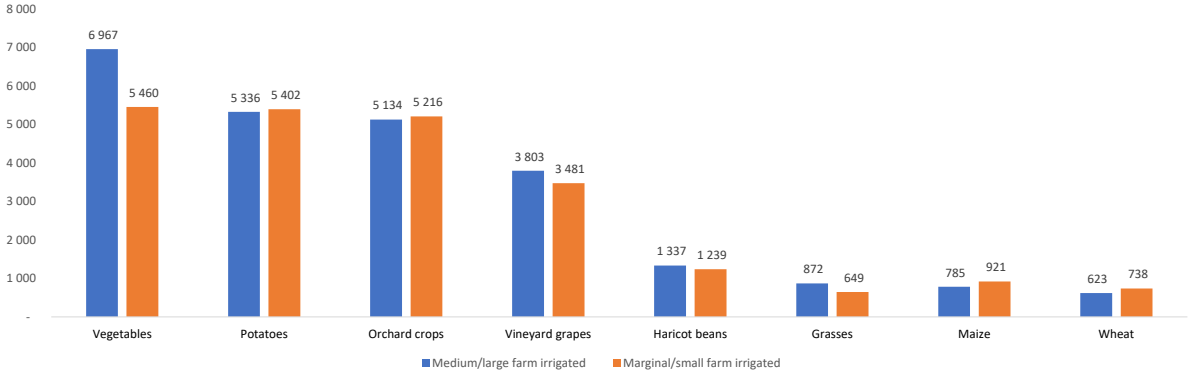
Compared yields of wheat (2017, t/ha, Faostat)



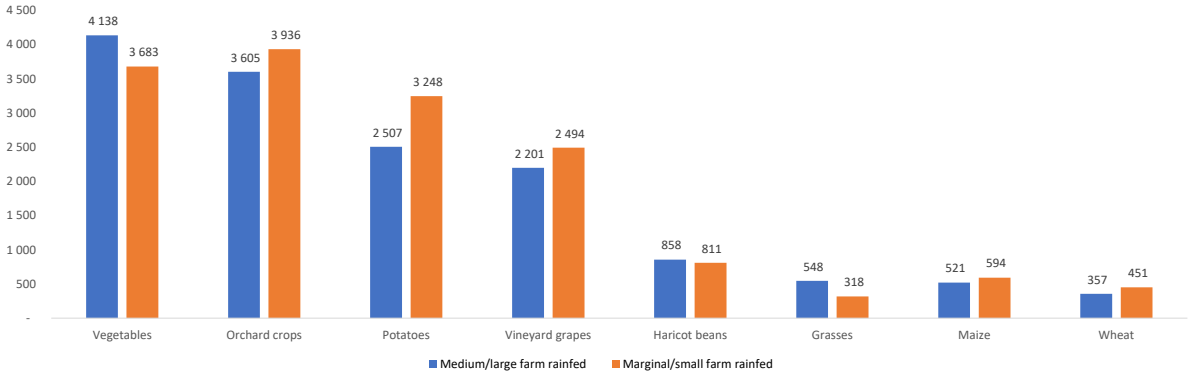
Compared yields of barley (2017, t/ha, Faostat)



Gross margins for irrigated crops
(GEL/ha, Irrigation Strategy for Georgia 2017-2025, Ministry of Agriculture of Georgia, LTD Georgian Amelioration, 2017)

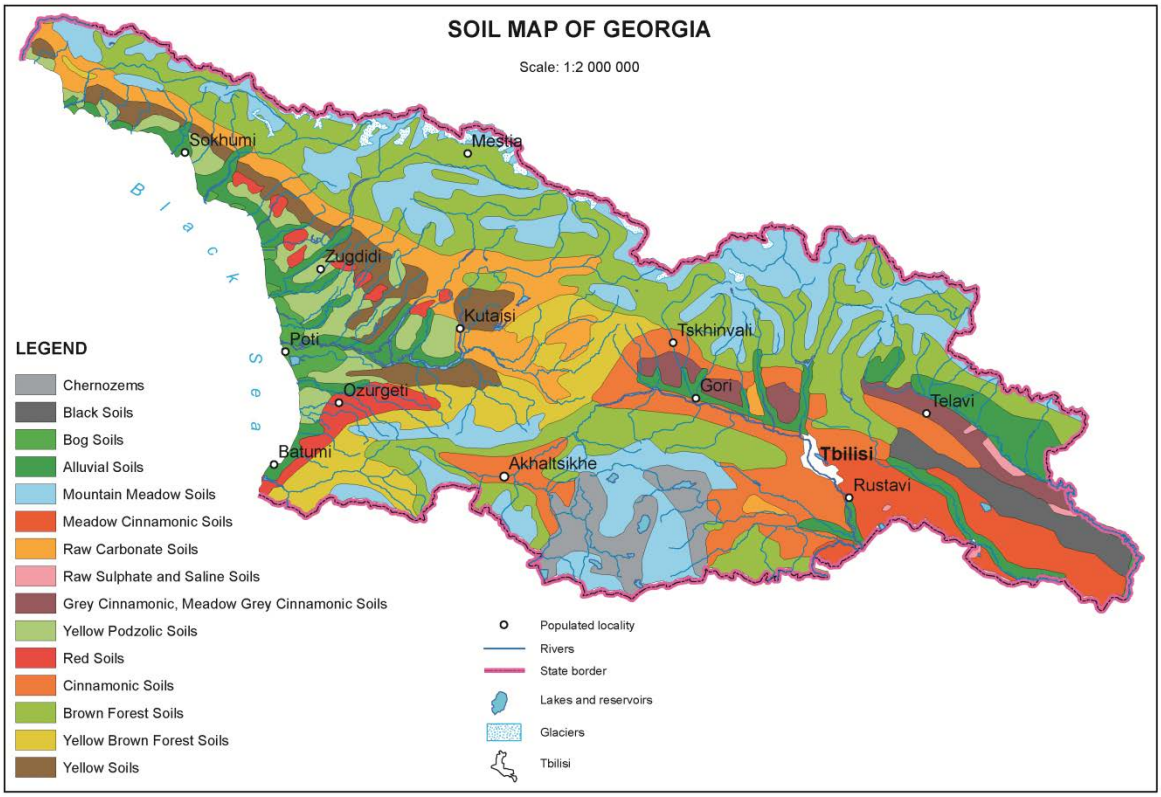


Gross margins for rainfed crops
(GEL/ha, Irrigation Strategy for Georgia 2017-2025, Ministry of Agriculture of Georgia, LTD Georgian Amelioration, 2017)



The second key factor is the profitability of maize. According to calculations made by Georgian MEPA and the World Bank[2], gross margins for maize, even though yields are very low, are much higher than for wheat for irrigated but also for rainfed areas as maize can be cultivated as such in many humid regions of Georgia, especially in Western Georgia. If and when Georgia will reduce its yields gap thanks to better technologies, practices and organization, we expect maize to become even more profitable. As a rule, Georgia is better positioned than most of its regional neighbours, including large ones like Russia or Ukraine, because most of them suffer from water scarcity[3]. In addition, Georgian soils are among the best for maize cultivation. Because of volcanic activity, they are often similar to the birthplace of maize, the volcanic plate of Anahuac in Mexico, but also to volcanic valleys such as Limagne in France.

[2] These gross margins will soon be updated by FinExCoop in different regions of the country.
[3] Georgian National Rainfall Index was 1,140 mm on average in 1998-2002 according to FAO, against 460 mm in Azerbaijan and 352 mm in Armenia.



Maize does not need much more water to grow than other cereals, but it is quite sensitive to water stress with medium-high sensitivity to drought according to FAO.

Indicative values of crop water needs and sensitivity to drought (FAO)		
Crop	**Crop water need**	**Sensitivity to drought**
Citrus	900-1200	low-medium
Alfalfa	800-1600	low-medium
Sunflower	600-1000	low-medium
Sugar beet	550-750	low-medium
Peanut	500-700	low-medium
Soybean	450-700	low-medium
Barley/Oats/Wheat	450-650	low-medium
Pepper	600-900	medium-high
Maize	**500-800**	**medium-high**
Tomato	400-800	medium-high
Melon	400-600	medium-high
Onion	350-550	medium-high
Cabbage	350-500	medium-high
Pea	350-500	medium-high
Bean	300-500	medium-high
Potato	500-700	high
Rice (paddy)	450-700	high

Maize is also much less tolerant of salt than other cereals or fodder beets for instance. It is in addition quite sensitive to waterlogging.

Its specific requirements for water explain partly why its performance has been poorer than that of other cereals in Georgia. Without efficient water and drainage systems, it is difficult for maize to really perform well.

According to the Irrigation Strategy for Georgia 2017-2025, "Actual irrigated area in Georgia, which was as much as 400,000 hectares during the Soviet period, had dwindled to one-tenth of that by 2015". Meanwhile, the World Bank estimates that 8% of Georgian soils are affected by waterlogging due to malfunctioning drainage systems and 7% by salinity.

But in the recent past, MEPA with the help of international development agencies has been quite active in the rebuilding of physical water infrastructure. Rehabilitation investment is expected to restore irrigable area to 200,000 hectares by 2025. And in December 2019, according to MEPA, 130,000 ha had already been rehabilitated. Similar work is expected for drainage, reducing the impact of waterlogging and salinity which is particularly negative in Western Georgia.

These large investments will reintegrate currently marginal land in the category of arable land. But if this "new" arable land is once again fragmented, yields will remain very poor and will not justify the heavy expenses in hydraulic systems. It would be therefore appropriate to take advantage of this land reintegration through a new agrarian strategy with a strong focus on the promotion of middle-size family farmers, especially young ones. In this field, Georgia could take advantage of the interesting historical experience of France which favoured since the 1960s the emergence of well-capacitated young farm entrepreneurs through the development of the so-called Safer[4].

In parallel with this necessary agrarian strategy to be implemented by the State, there is much scope for technical innovation for maize production, training and upgrading of local capacities and increasing of the outreach of the most effective technologies to a wider group of farmers able and willing to organize themselves in cooperatives. This is one of the goals of the FinExCoop project.

IV FinExCoop and maize

At field level, FinExCoop is currently focusing on the following value-chains, beef-and-dairy, potatoes, modern intensive apple orchards and goats for milks. For beef-and-dairy, for which maize usually plays a key role in feeding systems, pilot integrated development platforms involving multi-stakeholders able to generate agri-clusters are currently being launched. They are based on the combination of a Lead advanced farmer, able to play the role of a private experimental farm, and of near-by fellow farmers, usually smaller, FinExCoop intends to sooner or later (when they will clearly require it) organize in cooperatives.

This core group of Lead farmer/partner farmers is structured by four complementary development goals:

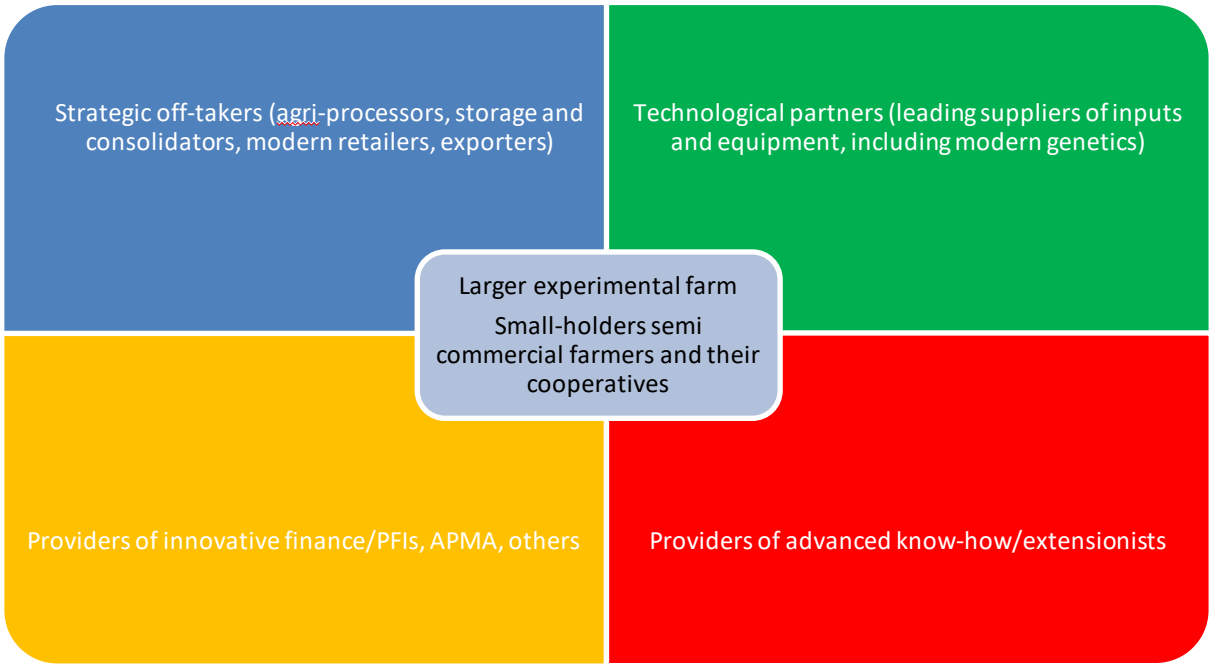
- Better access to the market

[4] https://www.safer.fr/

- Better access to advanced technologies usually provided by leading international Technological partners willing to use Georgia as a central springboard to develop their sales in the promising Silk road area
- Better access to know-how provided by leading Field specialists, usually from abroad
- Better access to financial resources

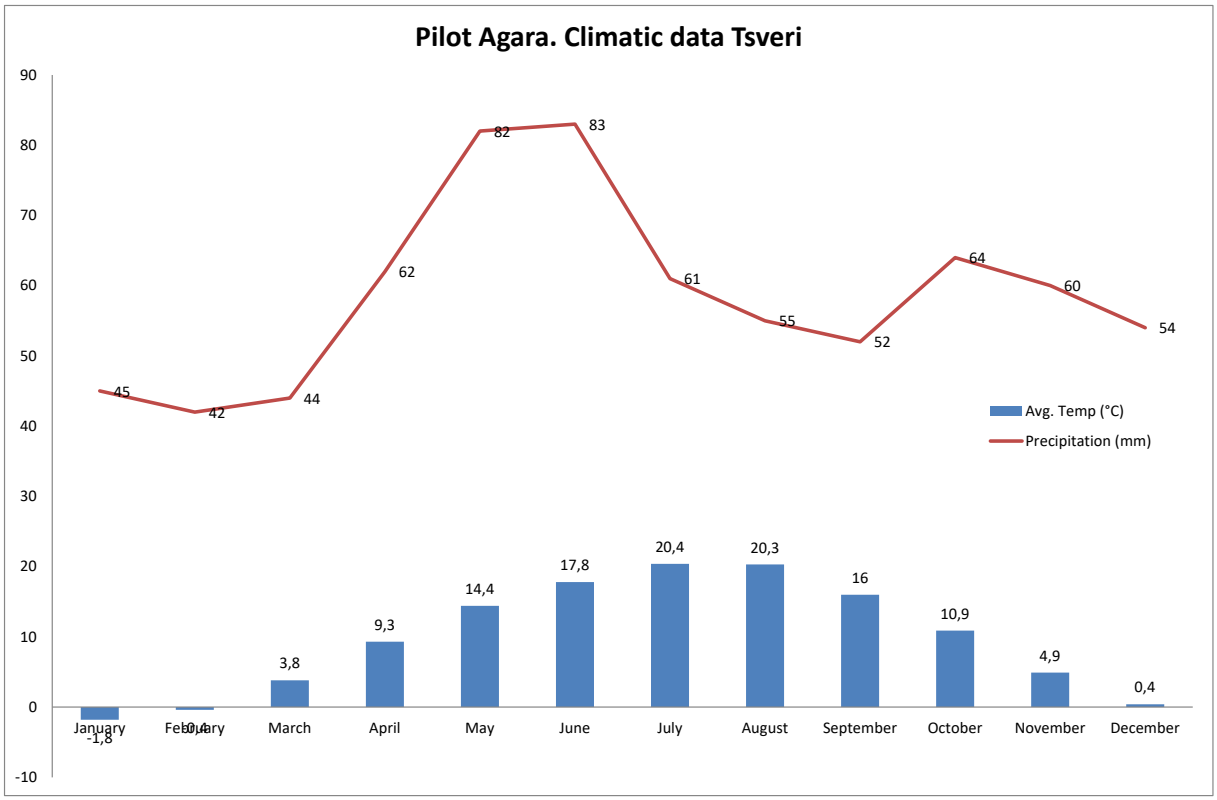
Innovation is a core component of the Pilots. It is based on a three-step approach:

- Test new technologies with Technological partners and with the support of Field specialists in demo plots or other activities (for instance in animal genetics) organized in the Lead farms
- Train local farmers and extensionists (training-of-trainers) in the use and interest of these technologies by making use of these plots/activities as demonstration fields/supports
- Transfer these technologies to smaller farmers, and especially those willing to join forces in cooperatives, making use of local extensionists being trained, and of better access to credit/investment grants organized by the Project.



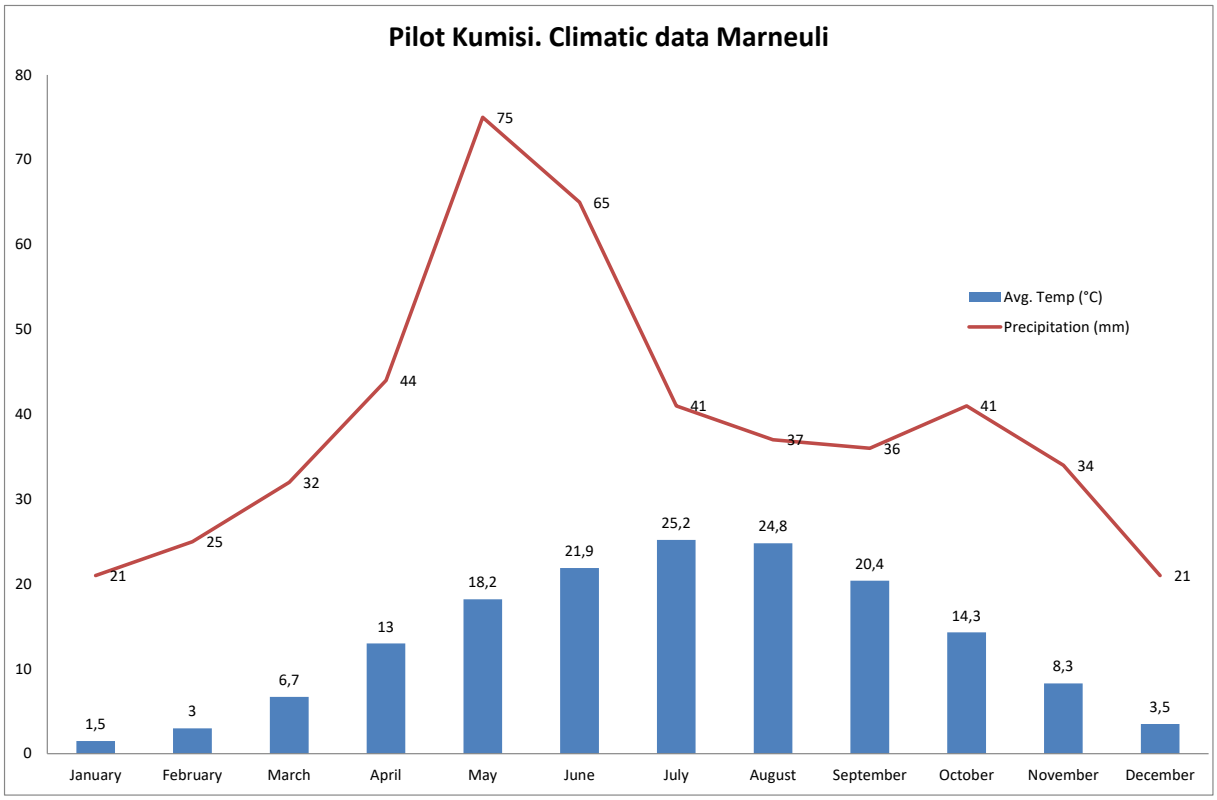
The climatic data for the four Pilots are the following.

Agara (local station Tsveri)



Kumisi (local station Marneuli)

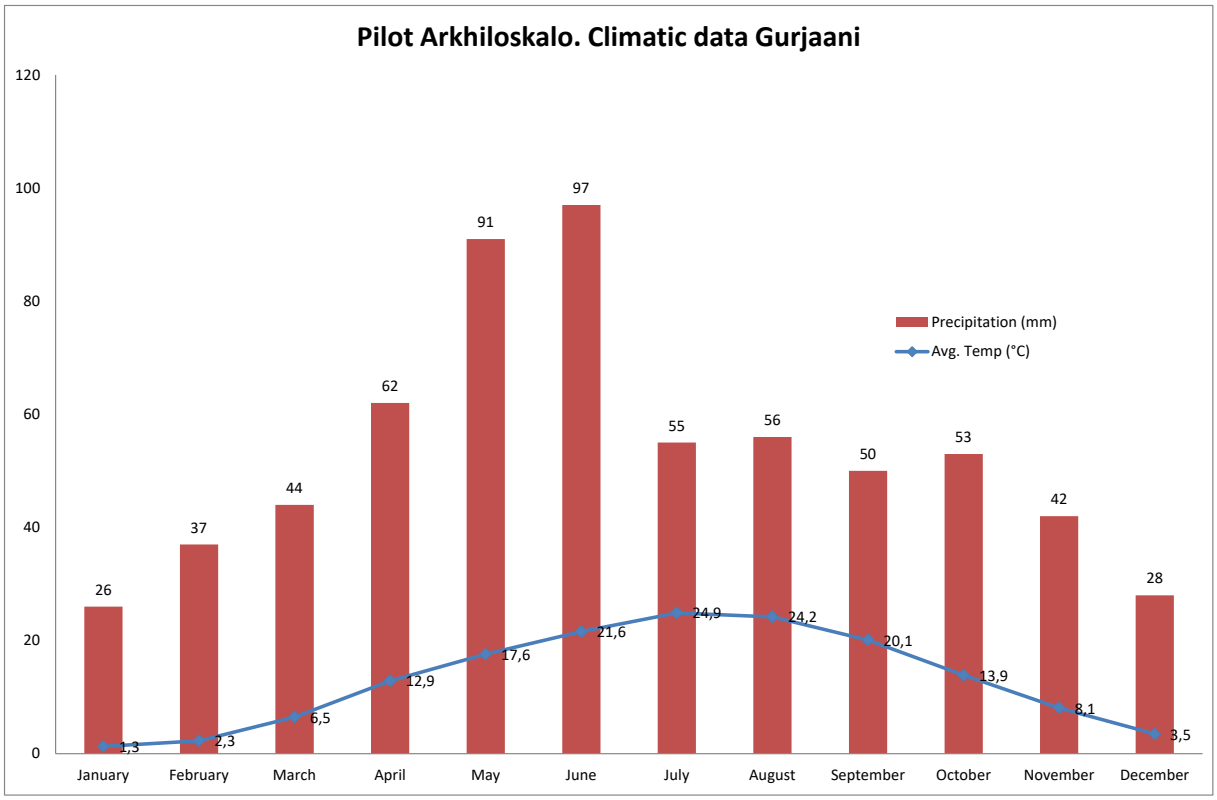
Marneuli/Kumisi														
	January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Average**	**Sum**
Avg. Temp (°C)	1,5	3	6,7	13	18,2	21,9	25,2	24,8	20,4	14,3	8,3	3,5	13,4	160,8
Min. Temp (°C)	-2,9	-1,6	1,6	7	12	15,8	19	18,6	14,5	8,7	3,7	-0,8	8,0	95,6
Max. Temp (°C)	5,9	7,6	11,9	19	24,4	28,1	31,4	31,1	26,4	20	13	7,8	18,9	226,6
Precipitation (mm)	21	25	32	44	75	65	41	37	36	41	34	21	39,3	472



Arkhiloskalo and Dedoplistkharo (local station Gurjaani)

This station is more appropriate than the one located in Dedoplistkharo itself as maize will be tested in the Alazani valley, much below (at least by 500 m) the city of Dedoplistkharo.

Gurjaani/Arkhiloskalo														
	January	February	March	April	May	June	July	August	September	October	November	December	Average	Sum
Avg. Temp (°C)	1,3	2,3	6,5	12,9	17,6	21,6	24,9	24,2	20,1	13,9	8,1	3,5	13,1	156,9
Min. Temp (°C)	-2,6	-1,7	1,8	7,1	11,9	15,9	19,1	18,5	14,6	8,9	4	-0,4	8,1	97,1
Max. Temp (°C)	5,3	6,3	11,2	18,7	23,4	27,4	30,8	30	25,7	19	12,2	7,4	18,1	217,4
Precipitation (m	26	37	44	62	91	97	55	56	50	53	42	28	53,4	641



In Arkhiloskalo, planting of maize will be made in May, just after a previous crop of meslin provided by seed supplier Jouffray-Drillaud. It is planned to use a zero till drill recently imported from Brazil by FAO. Ideally, as it is the case in South America where the maize/soybeans crop rotation is the norm, FinExCoop would like to promote permanent soil cover with production of proteins in from October till April/May and a second crop of maize from May to October.

As it is already the case with experimental fields developed with Jouffray-Drillaud and Florimond-Desprez, it is the intention of FinExCoop to largely promote their results through Demonstration days (prior to harvesting) and through on-line systems, in partnership with MEPA, the private on line extension service Kalo.ge, and in close coordination with supporting Technological partners and their local representatives.