

TUNISIA

Potentials and Possibilities for German Collaboration in Agriculture



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This report is work in progress and continuously being updated. Any feedback and suggestions for further improvement are welcome and can be sent to pari@uni-bonn.de.

ACKNOWLEDGEMENTS

The paper was developed within the project “Program of Accompanying Research for Agricultural Innovation” (PARI), which is funded by the German Federal Ministry of Economic Cooperation and Development (BMZ).



Federal Ministry
for Economic Cooperation
and Development

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1 General background information of the agricultural and food sectors

Tunisia occupies an area of 163,600 square kilometers and has an estimated population of about 11 million. Farmland covers about 10 million ha of which 4.2 are cultivated (8% irrigated). These areas are used for (i) grain farming: 1.7 million ha and (ii) tree growing: 2.2 million ha (1.7 million ha of olive trees). Agriculture is an important sector in the Tunisian economy. Its growth (6%) has been higher than that of the population (1%), it currently contributes about 11.5% of GDP, and employs about 22% of the Tunisian workforce providing one fifth of the jobs and permanent income to 470,000 farmers and 60,000 fishermen (Dhehibi and Rached, 2010; Augustin *et al.*, 2012). Agriculture contributes about 14% of the national investments. The sector is the largest user of the Tunisians resources such as 80% of water resources and 90% of fertile land (Havnevik *et al.*, 2007; Augustin *et al.*, 2012). The sector has registered about 25% growth since the year 2004 (Minot *et al.*, 2007). In addition, the sector ranks second in terms of production and value-addition. It contributes about 14% to the balance of payments through exports that is made up of olive oil, fruits (dates) and seafood. However, imports are made up of cereals, vegetable oil and sugar.

Over the last three decades and before the Tunisian revolution, agricultural policy was characterized by a heavy State control (Havnevik *et al.*, 2007). This is reflected by the following:

- Protection of the consumer buying power by giving priority to the domestic market;
- Mobilization of natural resources for the sector;
- Rural development and support to small-scale agriculture (family farming);
- Promoting the export of products that have a comparative advantage.

Two successive shocks have led authorities to begin discussions on a real strategy, first the 2008 food crises which led several vulnerable countries, including Tunisia, to review their concept of food security. Moreover, the revolution of 14 January 2011 proved how fragile the development models were being applied.

This led to the redefinition of the notion of food security on one hand and the refocusing of concerns on employment and regional development on the other hand. Refocusing should lead to a better consideration of smallholders in deprived regions.

1.1 Pan-African policies and strategies

CAADP

Since the launch of the Comprehensive Africa Agriculture Development Program (CAADP) in 2003, Tunisia has not met the CAADP 10% expenditure target (www.resakss.org). The average share of agricultural expenditure in total public expenditure was 8.5% during the 1995-2003 period; the share declined to 6.8% during the 2003-2008 period and further declined to 5.3% during the 2008-2013 period (*ibid*).

International cooperation

Building on its multiples identities (Mediterranean, Arab-Muslim, Maghrebin and African), Tunisia has diversified its collaborative relationships in various fields, particularly in agriculture. The **Mediterranean and Euro-Mediterranean area** has offered Tunisia several opportunities, including to be a member of CIHEAM (Centre International de Hautes Etudes Agronomiques Méditerranéennes) and its several initiatives and networks, to carry out joint research programs and technical projects, engage in collaborative networks for development

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and to be included in the various research networks, such as 7 th Framework Programme for Research and Technological Development (FP7) and Agricultural Research in the Mediterranean Network (ARIMNet). It has also given Tunisian agriculture a valuable advance through the ENPI-CBC-MED Good neighborliness initiative and has strengthened collaboration with France (which is a traditional partner), particularly through INRA, AFD and CIRAD. There are also good development-oriented collaborations with GIZ and DAAD in Germany.

Being a member of the **Maghreb region or the Arab-Muslim world** has always initiated direct bilateral or multilateral cooperation or through regional organizations such as Organisation Arabe pour le Développement Agricole (OADA) and Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD). Direct cooperation with **Sub-Saharan Africa** remains weak. Further it is indirectly more developed through international organizations (GIZ, AUSAID, KAFACI, ICARDA, etc.). Having joined the PARI program, Tunisia could strengthen this collaboration. Finally, the various cooperation projects contribute to the virtual library and the production of innovation.

1.2 National (and regional) policies and strategies

Tunisian Government agricultural sector policy is guided by Five Year Development Plans. Over the last 20 years, Tunisia has pursued an agricultural development strategy oriented towards economic growth and social stability. The main aim of this development strategy is to ensure sustainable productivity and improve access to foreign markets and thus, improve farmers' livelihoods. A summary of the development plans for the last two decades are as follows:

- The 8th Plan (1992-1996): Enhancing agricultural productivity through investments in applied agricultural research and extension, delivery of farmer support services, reforms in land tenure, agricultural credit and fiscal systems were carried out to encourage private entrepreneurship;
- The 9th Plan period (1997-2001): Domestic reforms in price subsidy in the face of a new Association Agreement with the European Union, WTO liberalization and the creation of the Arab Free Trade Area;
- The 10th Plan (2002-2006): Continuation of the 9th Plan and emphasis on private investment and smallholder agriculture's roles in social and regional development.

1.3 Data on food and nutrition security

The following section includes information about important socio-economic indicators, production and trade data and data on consumption and nutrition status.

Table 1: Selected national economic and health-related data

Indicator	Data	Year
Population, total	10,996,600	2014
Population growth (annual %)	1.0	2014
Rural population (% of total population)	33	2014
GDP per capita, PPP (constant 2011 international \$)	10,768	2013
GNI per capita, PPP (constant 2011 international \$)	9,719	2011
Poverty headcount ratio at \$2 a day (PPP) (% of population)	4.5	2010
Poverty headcount ratio at \$1.25 a day (PPP) (% of population)	0.7	2010
Poverty headcount ratio at national poverty lines (% of population)	16	2010
Rural poverty headcount ratio at national poverty lines (% of rural population)	no data	
Agricultural land (% of land area)	65	2012
Agricultural irrigated land (% of total agricultural land)	3.8	2011
Agriculture value added per worker (constant 2005 US\$)	4,424	2013
Agriculture, value added (% of GDP)	8.6	2013
Access to electricity, rural (% of rural population)	100	2013
Employees, agriculture, female (% of female employment)	no data	
Employees, agriculture, male (% of male employment)	no data	
Employment in agriculture (% of total employment)	16	2011
Literacy rate, adult total (% of people ages 15 and above)	80	2011
Ratio of female to male secondary enrollment (%)	105	2011
Mortality rate, under-5 (per 1,000 live births)	15	2013
Malnutrition prevalence, weight for age (% of children under 5)	2.3	2012
Malnutrition prevalence, height for age (% of children under 5)	10.1	2012
Maternal mortality ratio (modeled estimate, per 100,000 live births)	46	2013

Source: World Bank, <http://data.worldbank.org/country>

1.4 Data on most relevant crops and value chain

The most relevant crops in Tunisia include grains (wheat, barley), tree crops such as, olives, dates and almonds, vegetables (e.g., tomatoes, peppers, carrots), melons, potatoes. There is also a significant livestock sector. Production and consumption data are provided below.

1.4.1 Production

Table 2: Top 10 crops produced by area, volume and value

Area harvested (ha)		Production volume (tons)		Production value*	
Top 10	Share of Total	Top 10	Share of Total	Top 10	Share of Total
Olives	48.0	Wheat	17.2	Olives	14.3
Wheat	18.2	Tomatoes	15.0	Milk, whole fresh cow	10.8
Barley	12.3	Olives	11.0	Wheat	10.5
Almonds, with shell	5.1	Barley	7.1	Meat, chicken	6.8
Broad beans, horse beans, dry	1.5	Watermelons	4.9	Meat indigenous, chicken	6.7
Dates	1.4	Potatoes	4.6	Dates	6.3
Grapes	0.8	Chillies and peppers, green	3.8	Tomatoes	4.8
Pistachios	0.8	Onions, shallots, green	2.8	Almonds, with shell	4.4
Pulses, nes	0.8	Dates	2.4	Chillies and peppers, green	3.6
Tomatoes	0.8	Carrots and turnips	2.0	Eggs, hen, in shell	3.4

* Gross Production Value (constant 2004-2006 million US\$)

Note: nes refers to Not elsewhere specified.

Data: average 2011-2013, FAOStat, accessed 9 July 2015

Table 3: Top 10 fruits produced by area and volume

Area harvested (ha)		Production volume (tons)	
Top 10	Share of Total	Top 10	Share of total fruit
Dates	21.1	Watermelons	20.3
Grapes	12.7	Dates	9.8
Apples	9.4	Melons, other (inc.cantaloupes)	8.0
Figs	7.2	Oranges	7.1
Fruit, fresh nes	7.2	Peaches and nectarines	6.5
Peaches and nectarines	6.4	Fruit, citrus nes	6.3
Fruit, citrus nes	4.8	Grapes	6.2
Fruit, tropical fresh nes	4.7	Apples	6.2
Pears	4.1	Fruit, tropical fresh nes	5.0
Oranges	3.9	Grapefruit (inc. pomelos)	5.0

Data: average 2011-2013, FAOStat, accessed 9 July 2015

Note: nes refers to Not elsewhere specified.

Table 4: Top 10 vegetables produced by area and volume

Area harvested (ha)		Production volume (tons)	
Top 10	Share of total veg	Top 10	Share of total veg
Tomatoes	22.9	Tomatoes	45.6
Chillies and peppers, green	14.4	Chillies and peppers, green	11.6
Peas, green	9.6	Onions, shallots, green	8.5
Onions, shallots, green	7.9	Carrots and turnips	6.2
Melons, other (inc.cantaloupes)	7.3	Onions, dry	5.7
Vegetables, leguminous nes	7.3	Vegetables, leguminous nes	4.3
Vegetables, fresh nes	5.5	Vegetables, fresh nes	3.8
Carrots and turnips	5.3	Pumpkins, squash and gourds	3.0
Onions, dry	5.2	Cucumbers and gherkins	2.6
Cucumbers and gherkins	2.3	Lettuce and chicory	2.4

Data: average 2011-2013, FAOStat, accessed 9 July 2015

Note: nes refers to Not elsewhere specified.

Table 5: Top 5 meats produced

Top 5	% of meat production
Meat, chicken	41.0
Meat, turkey	18.4
Meat, cattle	18.3
Meat, sheep	16.1
Meat, goat	3.0

Milk, whole fresh cow: 98.6% of milk production

Data: average 2011-2013, FAOStat, accessed 9 July 2015

1.4.2 Consumption and nutrition status

Table 6: Food supply by tons, kg per capita and kcal per capita

Food supply quantity (tons)		Food supply quantity (kg/capita/yr)		Food supply (kcal/capita/day)	
Top 10	% of total	Top 10	kg	Top 10	kcal
Wheat and products	27.9	Wheat and products	204	Wheat and products	1630
Vegetables, Other	17.0	Vegetables, Other	124	Sugar, Raw Equivalent	341
Tomatoes and products	13.1	Tomatoes and products	96	Sugar (Raw Equivalent)	336
Sugar, Raw Equivalent	4.8	Sugar, Raw Equivalent	35	Sugar, Refined Equiv	336
Sugar (Raw Equivalent)	4.7	Sugar (Raw Equivalent)	35	Soyabean Oil	232
Fruits, Other	4.7	Fruits, Other	34	Vegetables, Other	84
Sugar, Refined Equiv	4.3	Sugar, Refined Equiv	32	Olive Oil	74
Potatoes and products	4.2	Potatoes and products	31	Pulses, Other and products	68
Oranges, Mandarines	1.8	Oranges, Mandarines	13	Palm Oil	60
Onions	1.6	Onions	12	Potatoes and products	60

Data: average 2009-2011, FAOStat, accessed 22 July 2015.

1.4.3 Trade

Table 7: AIC value chains: Meat /dairy, fruit (fruit trees), vegetables

Import volume (tons)		Import value (US\$)	
Top 10	Share of Total	Top 10	Share of Total
Wheat	36.9	Wheat	20.9
Maize	18.7	Maize	9.6
Soybeans	9.3	Soybeans	9.5
Barley	7.4	Sugar refined	7.3
Sugar refined	5.4	Oil, soybean	6.2
Oil, soybean	3.1	Oil, maize	4.8
Sugar Raw Centrifugal	2.9	Cigarettes	3.8
Oil, maize	1.9	Barley	3.5
Cake, soybeans	1.8	Sugar Raw Centrifugal	3.2
Bran, wheat	1.7	Oil, palm	2.6
Potato	0.7	Potato	0.8
Banana	0.5	Banana	0.3
Garlic	0.2	Garlic	0.1

Data: average 2010-2012, FAOStat, accessed 31 Oct 2015

Note: AIC value chains marked in red.

Table 8: Top Ten Export and Import crops

Export volume (tons)		Export value (US\$)	
Top 10	Share of Total	Top 10	Share of Total
Oil, olive, virgin	13.9	Oil, olive, virgin	23.0
Dates	10.5	Dates	15.0
Macaroni	10.4	Oil, maize	9.9
Oil, maize	8.1	Macaroni	4.5
Oil, soybean	5.8	Oil, soybean	4.1
Beverages, non alcoholic	4.6	Pastry	3.3
Flour, wheat	2.8	Crude materials	3.0
Tomatoes, paste	2.6	Margarine, short	2.7
Pastry	2.6	Food prep nes	2.3
Oranges	2.6	Chocolate products nes	2.2
Tomatoes	2.0	Tomatoes	1.7
Chillies and peppers, dry	1.8	Chillies and peppers, dry	1.7
Watermelons	1.6	Watermelons	0.7
Vegetables, fresh nes	1.1	Vegetables, fresh nes	0.5
Potatoes	1.1	Potatoes	0.4
Peaches and nectarines	0.7	Peaches and nectarines	0.4

Data: average 2010-2012, FAOStat, accessed 31 Oct 2015

Note: AIC value chains marked in red; nes refers to Not elsewhere specified.

Wheat and rice account for more than half of the import volume (55.6%) and for 30% of the import value. Fruit and vegetable play an important role in export trade. Meat and dairy products are not part of the Top 10. Detailed data for these AIC value chains can be found in the separate tables below.

Table 9: AIC value chain: Meat

Import volume (tons)		Import value (US\$)	
Top 10	Share of Total Meat Imports	Top 10	Share of Total Meat Imports
Meat, chicken	37.8	Meat, cattle, boneless (beef & veal)	36.5
Meat, cattle, boneless (beef & veal)	25.5	Meat, sheep	18.9
Meat, sheep	11.7	Meat, cattle	17.1
Meat, cattle	11.4	Meat, chicken	16.0
Offals, edible, cattle	6.7	Meat, turkey	6.1
Meat, turkey	5.3	Offals, edible, cattle	3.4
Meat, chicken, canned	0.6	Meat, duck	0.6
Meat, beef and veal sausages	0.4	Meat, chicken, canned	0.6
Meat, duck	0.3	Meat, beef and veal sausages	0.2
Meat, pig	0.2	Meat, pig, preparations	0.2

Data: average 2010-2012, FAOStat, accessed 31 Oct 2015

Table 10: Top Ten Export and Import animal and animal products

Export volume (tons)		Export value (US\$)	
Top 10	Share of Total Meat Exports	Top 10	Share of Total Meat Exports
Meat, chicken	80.2	Meat, chicken	72.2
Meat, turkey	16.6	Meat, turkey	15.3
Meat, chicken, canned	1.1	Meat, nes	6.2
Meat, nes	0.8	Meat, chicken, canned	3.5
Meat, dried nes	0.6	Offals, edible, cattle	1.5
Offals, edible, cattle	0.4	Meat, sheep	0.7
Meat, sheep	0.2	Meat, dried nes	0.5
Meat, pig	0.0	Meat, pig	0.1
Meat, cattle, boneless (beef & veal)	0.0	Meat, cattle, boneless (beef & veal)	0.1
Fat, liver prepared (foie gras)	0.0	Meat, beef, preparations	0.0

Data: average 2010-2012, FAOStat, accessed 31 Oct 2015

Note: nes refers to Not elsewhere specified.

Table 11: AIC value chain: Dairy products

Import volume (tons)		Import value (US\$)	
Top 10	Share of Total of Dairy Imports	Top 10	Share of Total Dairy Imports
Milk, skimmed dried	24.7	Milk, skimmed dried	30.8
Cheese, whole cow milk	15.3	Cheese, whole cow milk	24.2
Whey, condensed	15.3	Milk, whole dried	9.0
Milk, products of natural constituents nes	11.9	Milk, products of natural constituents nes	8.9
Milk, whole condensed	11.6	Whey, condensed	8.8
Milk, skimmed cow	6.7	Milk, whole condensed	8.6
Milk, whole dried	6.1	Butter, cow milk	3.9
Milk, whole fresh cow	3.8	Milk, skimmed cow	2.3

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Butter, cow milk	2.3	Milk, whole evaporated	1.8
Milk, whole evaporated	2.1	Milk, whole fresh cow	1.3

Data: average 2010-2012, FAOStat, accessed 31 Oct 2015

Table 12: Top Ten Export and Import dairy products

Export volume (tons)		Export value (US\$)	
Top 10	Share of Total Dairy Exports	Top 10	Share of Total Dairy Exports
Cheese, processed	35.2	Cheese, processed	58.4
Yoghurt, concentrated or not	34.3	Yoghurt, concentrated or not	24.6
Milk, skimmed cow	10.1	Milk, skimmed cow	4.8
Cream fresh	8.5	Cream fresh	2.7
Milk, whole fresh cow	4.9	Milk, whole dried	2.1
Buttermilk, curdled, acidified milk	2.2	Milk, whole fresh cow	2.0
Milk, whole condensed	1.4	Cheese, whole cow milk	1.4
Cheese, whole cow milk	0.9	Milk, whole evaporated	1.2
Milk, whole evaporated	0.8	Milk, skimmed dried	1.1
Milk, whole dried	0.8	Buttermilk, curdled, acidified milk	0.9

Data: average 2010-2012, FaoStat, accessed 31 Oct 2015

1.5 National (and regional) innovation system:

1.5.1 Research system and organizations

1.5.1.1 International

The Institution for Agricultural Research and Higher Education (IRESA) work closely with international organizations such as the European Union (EU), INRA, CIRAD, CEMAGREF, FAO, IAEA, ICARDA, IPGRI, CIHEAM, and ACSAD. The cooperation work on specific research programs like natural resources, animal health, and biotechnology.

The institution is a partner in several European projects within the 7th framework such as ARIMNet project (www.arimnet.net), ETC project (www.etcproject.eu), Foresterra project (www.foresterra.eu). The international organizations actively conducting agricultural research in Tunisia include:

- The United Nations Food and Agriculture Organization (FAO);
- The United Nations Development Program (UNDP);
- The World Bank;
- International Fund for Agricultural Development (IFAD);
- The Consultative Group International Agricultural Research (CGIAR):
 - International Center for Tropical Agriculture (CIAT);
 - International Center for Agricultural Research in the Dry Areas (ICARDA).

1.5.1.2 National

Agricultural research in Tunisia is primarily funded by the government but with the assistance of the World Bank and other bilateral and multi-lateral donors (including the EU). There are eight public agricultural research institutes and nine agricultural higher-education

agencies in Tunisia. The Agricultural Research and Higher-Education Institute (IRESA), is a semi-autonomous public agency established in 1990 and is responsible for overseeing agencies that are involved in agricultural research.

a. Institution of Agricultural Research and Higher Education (IRESA)

Established in 1990, IRESA is a public administrative institution with the civil personality and financial autonomy under the supervision of the Ministry of Agriculture and Water Resources. IRESA activities cover natural resources management, plant and animal science, emerging diseases, sustainability of agricultural production, food security and food safety, horticulture, aquaculture and fisheries. The main activities include:

- Promoting agricultural research in Tunisia through the coordination of research (6 Research Institutes, 4 regional centers and 2 regional research clusters and more than 20 experimental stations) and higher education (11 institutions) in this field;
- Disseminating agricultural knowledge ;
- Setting up, funding and monitoring national research programs;
- Promoting cooperation between Tunisian and foreign researchers;
- Coordinating and evaluating of the national programs.

b. National Agricultural Research Institute of Tunisia

The National Agricultural Research Institute of Tunisia (INRAT) was founded in 1906 and is a governmental scientific research institution under the Ministry of Agriculture and Water Resources. It is the first Tunisian institute specialized in agricultural research. Since 1961, research activities at INRAT cover all fields of agricultural science research, including animal and crop production, biophysical and socio-economic research. INRAT's main objectives are (Salem, 2010):

- Improvement of techniques for animal and crop production;
- Evaluation and upgrading of genetic resources in Tunisia;
- Selection of crop varieties and improvement of animal breeds;
- Performing agro and socio-economic research in relation with the rural environment;
- Contribution to technology transfer and capacity building through teaching and supervising graduate and post students as well as training of students and technicians working in national and international organizations.

c. Tertiary Educational Institutions

In Tunisia, there are more than 198 higher education institutions organized into 13 public universities and 25 Higher Institutes of Technological studies (ISET) covering all specialties and the whole territory. There is also a virtual university. In 2003, as part of the reform of the national research, consideration was given to the establishment of the following:

- Research laboratories and unit, and
- Specialized support units—one unit for the valorization of research outcomes and another for documentation and publishing.

As a result, university research was organized into 241 research laboratories and 174 research units.

1.5.2 Innovation platforms

- pending further information -

1.5.3 Extension system and organizations

Prior to 2011 uprising, extension was provided by the:

- Ministère de l'Agriculture, des Ressources Hydrauliques et de la Pêche (Ministry of Agriculture, Hydraulic Resources and Fisheries), and
- l'Observatoire National de l'Agriculture.

Agricultural extension services in Tunisia are provided by both governmental and non-governmental actors. Agency for Extension Agricultural Training (AVFA) is the public administrative body overseeing agricultural extension, training and oversight of extension staff (Augustin *et al.*, 2012). Agricultural extension services are also provided through projects funded through the national budget or those funded through the international donors such as World Bank, l'Agence Française de Développement (AFD), and UN agencies.

Extension services are also provided by the extension offices with specific budget provisions and also through agricultural professional associations and unions such as the Tunisian Union of Agriculture and Fisheries (UTAP) (*ibid.*).

1.5.4 Private R&D activities

- pending further information -

1.6 Key challenges, emerging needs and potentials in the agricultural sector

Overall, the current situation regarding innovation in agriculture shows the low value placed on research outcomes. The main issues are prioritized as follows:

- Decision and research activities are centralized
 - Concentration of human and material resources at the central level
 - Failure of regulations to meet research needs
- Scarcity of useful results
 - Dominance of academic research
 - Inadequacy of monitoring and transfer procedures
- Low profitability of R&D connecting structures
 - Insufficient coordination between stakeholders
 - Lack of procedures to streamline results
- Limited contribution of the profession to research mechanisms
 - Lack of adequate professional structures
 - Dominance of small and medium-sized holdings

However, this assessment is totally subjective in the absence of tangible indicators to measure the level of adoption of research outcomes particularly in agriculture.

Based on the general approach (see Africa-wide study Chapter 4) and in pursuit of efficiency and effectiveness, investment by Germany into the agricultural and food sector are suggested in those African countries, which:

- Show actual progress in sustainable agricultural productivity driven by related innovations, as indicated by comprehensive productivity measurement and innovation actions on the ground;
- Have a track record of political commitment to foster sustainable agricultural growth, as indicated by performance under CAADP, and

- Prioritize actions for hunger and malnutrition reduction and show progress, but where agricultural and rural development and nutrition interventions are likely to make a significant difference, as indicated by public policy and civil society actions.

Table 13: Country level Performance Indicators

Indicator	Index	Performance (%)
1. Number of Years with more than 6% agricultural growth (2005 to 2014)	4	40
2. Percentage point change in TFP index between 2001 and 2008	na	na
3. Number of years with more than 10% government expenditure (2005 to 2014)	0	0
4. Average share of agricultural GDP spent on R&D (2005 to 2011) in %	na	na
5. Steps in CAADP completed	0	0
6. Percentage point improvement in undernourishment between 2001 and 2011	0	na
7. Global hunger index (2014)	<5	0
Total score (weighted)		13

Source: Own computation based on World Bank (2015), FAO (2015), ASTI database and von Grebmer *et al.* (2014), na refers to data is not available.

Note: the % performance (rounded) is defined as follows for the respective indexes: 1. % out of 10 years; 2. classes: if <1, or negative= 0; 1 – 7= 30, 8-15= 60, > 15= 100; 3. % out of 10 years; 4. % of the AU target value of 1% spent on R&D; 5. % of the desired 8 steps; 6. classes: if < 2 = 0; if 3-5= 30; if 6-10=60, if>10=100; 7. classes: if < 12= 0; 12-16: = 60; 17-20: = 60; > 20= 100.

Total score (weighted) performance and need to invest: (1. (expected growth performance); + sum of (3.+5.)/2 (expected government commitment); + 7. (Performance in food and nutrition security and need)) divided by 3. Three indicators are discarded in the computation of the weighted total performance score due to data paucity problem.

Based on this approach, investments into the agricultural and food sector of Tunisia cannot be expected to have a significant effect on the food and nutrition security situation in the country.

Results of assessment (Table 13):

Expected agricultural growth performance:

- Tunisia has increased its agricultural growth by more than the annual 6% agricultural growth target defined by CAADP only for four years, between 2005 and 2014 (www.resakss.org).

Government commitment:

- Tunisia has no a track record of political commitment to foster sustainable agricultural growth by being inactive in the CAADP process and do not complete even a single step in the CAADP process (www.resakss.org);
- In addition, Tunisia has not shown willingness to invest in agricultural sector. In no single years the government has invested more than 10% of total government expenditures (CAADP target) in the agriculture between 2005 and 2014 (www.resakss.org).

Food and nutrition security progress and need:

- In addition, Tunisia has the GHI score value of <5 reflecting only a low level of hunger (von Grebmer *et al.*, 2014)¹. This makes the investment into the agricultural and food sector in Tunisia less urgent in terms of reducing children mortality rate and the proportion of the undernourished people and underweighted children.

The economic, political, and social/nutrition framework in Tunisia does not seem to suggest accelerated investments into the agricultural and food sector of the country.

2 Most relevant value chains in Tunisia

2.1 AIC value chains

The value chains chosen for the Agricultural Innovation Center (AIC) in Tunisia include meat/dairy, fruit/fruit trees and vegetables.

2.1.1 Meat and Dairy Value Chain

The importance of dairy sector plays in Tunisian agricultural sector cannot be overstated. Available statistics show that it contributed to about 11% to the value of agricultural production and about 25% of the total value of the livestock output in 2009 (Mattas *et al.*, 2012). It is also a source of income to farmers, and thus contributes to their stability and growth which is important for them to cope with financial constraints. The dairy sector is also important source of employment due to its labor intensive nature.

Opportunities exist in the milk collection for the producers because they provide them with regular incomes and lower market risk and ensure stability in fresh milk supply to the dairy industries. There are two types of organizations for milk collection identified in Tunisia; formal and informal (CIHEAM, 2012 and Montaigne *et al.*, 2015). Other opportunities exist in the milk processing and milk marketing.

2.1.2 Fruit and fruit trees Value Chain

Citrus and Orange Fruit Production:

Tree crop activities are important in the agricultural sector in Tunisia. They contribute about 30% of value addition in the agricultural sector. Olive and citrus are particularly the most important tree crops in the country. They provide employment and help boost the economy of the country through the export earnings (Mattas *et al.*, 2012; Montaigne *et al.*, 2015).

Citrus production structure

Citrus plantations cover an area of about 22,000 ha. The main crop variety is Maltese variety which represents about 32% of the total orange groves. The total area dedicated to oranges has increased over the last twenty years due to expansion of irrigated areas and also as a result of increased crop densities. Only 10% of citrus produced is destined for export market, with the bulk (90%) are consumed locally (CIHEAM, 2012).

2.2 Other relevant Value Chains

- *pending further information* -

¹ GHI score Values less than 5.0 reflect low hunger, values from 5.0 to 9.9 reflect “moderate” hunger, values from 10.0 to 19.9 indicate a “serious” level of hunger, values from 20.0 to 29.9 are “alarming,” and values of 30.0 or greater are “extremely alarming”(von Grebmer *et al.*, 2014).

3 Innovations in value chains in the past 20 years

3.1 The most crucial limiting factors Tunisia / AIC-region / in AIC value chains

Limitations in the citrus value-chain include specific market requirements and value adding activities associated with boosting the citrus chain industry in Tunisia, which are primarily juiciness, sweetness and perishability. While the information flow and the relationships between different levels of the chain are for the most part strong, a lack of export contacts is a consistent barrier for European buyers in sourcing fresh oranges from Tunisia.

3.2 The most important / beneficial innovations in the relevant value chains

3.2.1 AIC value chains

- pending further information -

3.2.2 Other value chains and cross-cutting innovations

A. Regional radio in Tunisia: linking indigenous innovation and formal research and development: (Reij and Waters-Bayer, 2001).

When the Arid Region Institute (Institut des Régions Arides, IRA) in Médenine, Tunisia, set out to seek the dynamics of indigenous knowledge (IK) in marginal rural areas of central and southern Tunisia, it discovered a large number of farmers - both men and women - who were developing their own innovations without the support of formal research and development services. In order to spread information about these innovations and to forge links among farmer innovators, and between these and other researchers and extensionists, the multi-disciplinary research team at IRA organized field visits. However, a much further-reaching mechanism to disseminate and stimulate farmers' ideas and experiments proved to be a weekly radio program on agricultural innovation.

B. Oases Ecosystems and Livelihoods Project (World Bank, 2014)

The Tunisia Oases Ecosystems and Livelihood Project objective is to improve sustainable natural resources management and promote livelihoods diversification in selected oases. In order to achieve its objectives, the project focusses on three main fields of intervention: (i) help create an enabling environment to better manage oases at national level, (ii) support the implementation of the strategy on a small scale (six selected oases which are representative of the variety of Tunisian traditional oases), and (iii) provide support to the implementation of the activities and their monitoring and evaluation. Therefore, in line with this approach, are the following components: (i) strengthening capacities for sustainable management of oasis ecosystems, (ii) supporting the implementation of the Oasis Participatory Development Plan (iii) project coordination and management.

C. The European Bank for Reconstruction and Development (EBRD) Local Enterprise Facility

The European Bank for Reconstruction and Development (EBRD) is developing the agricultural sector in Tunisia by providing a € 4 million loan to Sanlucar Flor'alia, the first large-scale raspberry plantation ever established in the country. The product will mainly be exported to Europe and the Middle East. The EBRD-funded project, located in northern Tunisia in the Governorate of Bizerte, will introduce new varieties and will involve the innovative use of modern agricultural methods, allowing the farm to minimize the

consumption of water, fertilizers and pesticides. Furthermore, the project will provide new and stable jobs for farm workers and agricultural engineers.

D. Technological innovations for enhanced adaptation to climate change in North Africa

There is little doubt that Tunisian agriculture will be affected by the effects of climate change (increased temperatures, heavy rainfall events etc. (Nefzaoui *et al.*, 2012). Therefore, research for innovations to increase adaptation is ongoing on different aspects of agriculture and includes:

- Soil and water conservation and use;
- Conservation agriculture;
- Biodiversity and crop variety development;
- Integrated crop-livestock-rangeland production systems:
 - Participatory collective rangeland management;
 - Matching small ruminant breeds to environments;
 - Efficient animal feeding using cost-effective alternative feeds.

E. Institutional innovations: Empowering local communities

Promoting community-based organizations and empowerment will support adaptation to climate change (Garforth, 2008) through:

- Helping to build strong institutions that can facilitate both collective and individual adaptation and response to climate change and other external pressures, both in the short and long term;
- Platforms for managing conflict over natural resources;
- Creating and intensifying learning opportunities, to broaden the set of information and knowledge available to farmers and support local innovation. Livestock Field Schools are an example of how this can be done;
- Supporting local innovation processes;
- Helping livestock keepers identify opportunities to enrich the set of options they have when making livelihood choices, e.g., re-thinking how advisory services are provided, particularly to small-scale, relatively poor livestock keepers.

3.3 Most promising approaches for farmer and small business related value chain innovations

A. Citrus Value chain

Some elements for improvement of the current approach are suggested:

- Better extension work, and a better supply of vegetal material, so that farmers and investors in the citrus sector can choose varieties that better respond to importer preferences. These varieties need to be reinforced and extended to other markets;
- Providing incentives to producers and marketers to improve logistics facilities to extend the shelf-life of Tunisian oranges on international markets and reduce waste, since transportation is increasingly a key element affecting the citrus supply chain and in preserving the quality of products;
- Encourage promotional campaigns of citrus products outside traditional markets so as to facilitate the establishment of contacts between traders and improve the image of Tunisian oranges;
- Facilitate the credit acquisition by the citrus industry so as to enhance investment capabilities in quality improvements.

The role of the citrus industry in Tunisia is significant within the agricultural sector in view of its direct and indirect linkages with the other economic sectors and its export earnings. However, rapidly changing market drivers and competition among fruits make it necessary to improve the competitiveness of the citrus production to better compete in local and international markets. A key instrument in improving competitiveness is to achieve a better management of the value chain. Exporters who wish to increase their competitive advantage face challenges ranging from increasing trend in inputs costs, to issues of distribution, transport, quality and adequate marketing and promotion practices. The needed policies should aim at recognizing the citrus sector as an essential component of Tunisian agriculture. The main objectives to be addressed are:

- Improving the competitiveness of citrus products through a better response to international consumers;
- Identifying and expanding marketing and business opportunities for producers and exporters;
- Improving the supply and the quality of citrus produce through the value chain.

4 Suggestions for Collaboration

4.1 Promising agricultural products and value chains.

Besides assessing the returns of investments into institutional innovations in Tunisia, analysis to choose the most promising value chains in the country is also undertaken. In compliance with the availability of data and the purpose of the study four criteria that focus on poverty and market potential are used to select the five most promising agricultural products from the long list of agricultural products the country produces and sells. The first indicator, the trade potential (revealed comparative advantage (RCA) index), is computed to identify value chains over which the country has revealed (but not potential) comparative advantage. In the present case, the RCA index compares the share of a given agricultural product in Tunisia's export basket with that of the same product in total world exports. The second indicator, yield gap, is used to assess the expected return of the envisaged Germany investment on the given AIC country value chains. A third indicator, average yield growth, is used to examine the Potential of the product for poverty reduction. The production share of total supply is also used to assess the present integration of the poor in the market (relevance).

The summary of the five most promising value chains based on Revealed Comparative Advantage (RCA) index, average yield growth and relative yield gap is reported in table 14 below. The production share, RCA index, actual yield growth and relative yield gap for the GIZ-selected value chain(s) is also reported at the bottom of the table, when they are not included in the list of the first five most promising value chains.

Table 14: Selection of promising agricultural products /value chains

Rank	Rank by RCA		Rank by yield progress**		Rank by relevance of crop	
	Name of agricultural product	RCA index (2012)*	Name of the crop	Average annual yield growth (2005 to 2012)	Name of agricultural product	Production share of supply (2012)*
1	Dates	144	Carrots and turnips	36	Lemons, Limes and products	102
2	Oil, maize	77	Vegetables, leguminous	30	Oats	100
3	Oil, olive, virgin	31	Watermelons, melons	13	Honey	100
4	Chillies and peppers, dry	14	Broad beans, horse beans	9	Rape and Mustard seed	100
5	Cheese, processed	13	Pears	8	Cottonseed	100
GIZ Selected products	Fruit, dried nes	1.08	Chillis, green pepper, onion	6	meat	100
	meat	1	Orange	5	vegetable	99
	vegetables	0.92	apples		Fruit	99

Source: * Own computation based on FAO 2015 data

Note: ** a minimum of 0.5 % production (volume) share threshold is used as a screening (crop relevance) criteria.

Results of assessment (Table 14):

- The trade potential (revealed comparative advantage (RCA) index) is very high for dates, maize and olive oil, dry chillies and peppers and processed cheese. This indicates that Tunisia has comparative advantage (in the export) of these commodities. The computed global Balassa indices have also shown that Tunisia has a modest revealed comparative advantage on the global market on the export of one of the GIZ selected value chain, fruit, while it has a comparative disadvantage in the other GIZ selected value chain, vegetables;
- The yield performance indicating progress suggests that over the CAADP period (2005 to 2012) the GIZ selected fruit and vegetable value chains (carrots, leguminous vegetables, water melons, melons, pears) and broad beans are the most promising value chains. The yield level of chilies, oranges and apples also shows a modest average growth;
- In terms of relevance (production share of supply), lemons, limes and products, oats, honey, rape and mustard seed and cottonseed are the leading. The total production of the first products exceeds the total supply. The total supply of the last four products and all the GIZ selected value chains are also domestically produced.

4.2 A systematic assessment of promising partnerships for each promising innovation area

Partnership to foster agricultural innovation will be most useful in the case of Tunisia; such partnership should give attention to pertinent issues such as:

- Development and use of technology packages that enable production with minimal water requirement;
- Technologies development to enhance productivity and competitiveness in price of commodities;
- Development of moisture conservation techniques ;
- Development and use of national agricultural development plans;
- Facilitating capacity development for the smallholder's farmers;
- Mechanization of the smallholders' system to enhance competitiveness and reduce drudgery;
- Development of an export promotion system to ensure income delivery;
- Enhancing entrepreneurial capacity of agricultural stakeholders.

4.3 Some potential partners for the German collaboration: in science and research, private sector and NGOs and governmental organizations

An entry point for German-Tunisian collaboration will be the existing national agricultural research and development organization. Collaboration with the Institution for Agricultural Research and Higher Education (IRESA) could leverage a good opportunity to access various research and development partners in agricultural research.

The current PARI program is already working with INRAT, the national agricultural research organization.

4.4 Needed implementation research

- pending further information -

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