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Characterizations of granted aid by the state at agriculture in the agricultural development fund in El Hajeb province (Morocco)

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Abstract

The province of El Hajeb extends in an area of 222000 ha. It has a large agricultural potential due to the topography of the land, the rich and varied soils and a continental climate. This region undergoes mutations linked to the development of drip irrigation. It is among the biggest beneficiaries provinces agricultural subsidies in the Agricultural Development Fund (ADF). 837 million of Dirham of the investment private was injected during the period 2008-2012 which 316 million was borne by the State. Subsidizing irrigation schemes represented of 55% of the total, followed by an intensification of vegetal and animal production. The area equipped and subsidized in drip was multiplied 5 times from 2008 to 2012. The distribution of this aid by the size of the huge operating disparities; big farmers were equipped about 44% of the total area in drip irrigation and received of 42% of the aid while small farmers were equipped 6% of the area. This research reveals that the area of gardening equipped of drip decreases of the exploitation size (<5 ha) to the class over the 100 ha. Moreover the tree tends to increase from the small exploitation to the largest. Thus, the extension of the areas irrigated by pumping increases the demand of water which leads to overexploitation of the groundwater, already threatened, and can cause long-term irreversible damage.

Keywords: El Hajeb, ADF, Irrigation, Investment, groundwater, grant

Introduction

The strategy of the Green Morocco Plan relates a sector which contributes 19% of the Gross Domestic Product (GDP), with 15% in agriculture and 4% in agro-industry. This sector employs more 4 millions of rural and creates about 100 000 jobs in the Agrifoods field [1].

The investment in the agricultural sector is characterized by a low use of production factors. It's often represented by a low participation of the banking system to finance agricultural projects with only 18% of farmers who have access to bank loans, a Low of grant from the agricultural sector: subsidies Moroccan agriculture are of the order of 8% compared to agricultural income against 30-70% in other countries. A weakness of the tissue of the agro- industry, which represents only 24% of the all national industrial units and transforms barely a third of production [2].

Since its inception in 1986, the Agricultural Development Fund (ADF) has set the objective of promoting private investment in agriculture sector and its direct with subsidies to activities that allow a better exploitation of national agricultural potential. The incentive agricultural system has undergone several revisions. The new subsidy system came into force in 2010, aims to improve the expansion of private investment in agriculture through the instauration of new aid, building aid allocated and the encouragement of aggregation. With this redesign, the overall amount of subsidies granted by the State in the ADF increased from 1.585 million dirham in 2009 to 2570 million dirham in 2012 [3].

Faced with the difficult situation of water resources which continues to get worse, water saving is now an essential axis of the new policy of the water of the Morocco. The irrigation has emerged as an indispensable

channel for agricultural development and as such it received special attention on the part of the State [4]. Hydro-agricultural management of agricultural properties received 53% of the total of subvention accorded in 2012, which amounted to 2.56 billion dirham [2].

Climate data collected during the period 1960-2000 indicates a mean warming on the all territory of the country (Morocco) with a maximum of 1.4 °C in the South - East. On two-thirds of the country this warming however exceeds 1 °C [5]. These data also show a tendency to the decrease in rainfall. Annual rainfall generally declined quite significantly at the level of the Sais (Meknes) and the High Atlas (Ifrane). This deficit relates in particular to winter precipitation knowing that these are crucial in the year [6-7].

The frequency of drought has increased since 1940 from an eight year between 1940 and 1979. About one year to three between 1980 and 1995, reaching a frequency of once every two years between 1996 and 2002 [8-9].

Numerous studies have shown that the Moroccan climate tends to change to warmer and drier conditions. The report, prepared by experts from the GIEC in 2013, indicates that in the coming years, the rainfall should continue to save assessed decreases to nearly 20% in 2050 and 30% by 2080 [10].

The potential of natural resources in water is estimated at 22 billion m3 per year, the equivalent of 730 m^3/habit/year [11]. These resources are characterized by their temporal irregularity and their unequal space repair. Surface water throughout the territory is evaluated in average year to 18 billion m3 with amplitude of variation ranging from 5 to 50 billion m^3 [12]. Concerning groundwater, on the 96 listed tablecloths, 21 are deep aquifers and 75 superficial aquifers. The most important aquifer systems cover a total area of nearly 80.000 km2, either about 10% of the national territory [11]. These resources know currently experiencing an overexploitation due to the proliferation of capture works. Indeed, the total number of wells and boreholes hollow and subsidized during the period 1988-1999 is the order of 50.021 with an average annual national 4.168 wells and boreholes. In 2002, this average has been elevated to 7.647 units. The overall volume taken annually is estimated at 3.4 billion of m3 of water; about 72% comes from groundwater. The latter represent approximately 20% of the potential of the country's water resources [13].

At the province of El Hajeb, these aids have generated a cumulative global investment of the order 837 million Dhs during 2008-2012 [14]. This manuscript presents the results of the analysis of data relative in private investment of the farmers in the province of El Hajeb during the period 2008-2012 and the various aids which they received over the same period. It discusses the distribution of subsidies by exploitation size farm and investment type of and especially irrigation drop projects.

Methods

Presentation of the study area

The province of El Hajeb is located at the junction of the rich plain of Saiss and foothills of the Middle Atlas. It's bounded to the north by of Meknes province, to the south by the Ifrane and Khenifra province, at East by Fez and Sefrou province and the west by the province of Khemissat (Figure 1).

The climate is semi-arid Mediterranean undergoing continental influences. Winters are cool and rainy and hot and dry in summer. The annual rainfall is 520 mm. The minimum average temperature is 2.8 °C in January and maximum in the month of August with 38.2 °C. The population is estimated at 240 000 inhabitants with 64% are rural.

Water supplies available to it give it an importance in terms of water resources of the Kingdom. It has a high agricultural potential due to the presence of groundwater and surface water of the Fez-Meknes basin. This basin is drained by a large number of sources and rivers which flow regime is dependent on the hydrodynamics of groundwater and rainfall inputs.

The province of El Hajeb potential benefits of various agricultural productions related to the topography of the land, rich soils. These potentials have led to significant changes in irrigated agriculture through the adoption of localized irrigation systems for gardening and fruit growing.

However, this evolution is hampered by problems of irrational use of groundwater resources (Secretariat of State in charge of Water 2004). The balance of the water is unbalanced; there is a deficit of 1 million m^3 per year. These resources are increasingly threatened by pollution generated by the use of increasingly intensive fertilizers and pesticides. The degree of contamination of groundwater by nitrates is above the threshold of 50 mg/l in most irrigated areas [15].

The main impact of overexploitation is the decline in groundwater levels. Indicative, the deep water of the aquifer of the Saïss increased 60 m in twenty years. Maximum annual reductions range between 2 and 4 m [16]. The province of El Hajeb covers an area of 222.000 ha, of which the utilized agricultural area is 146 000 ha distributed as follows (Table 1).

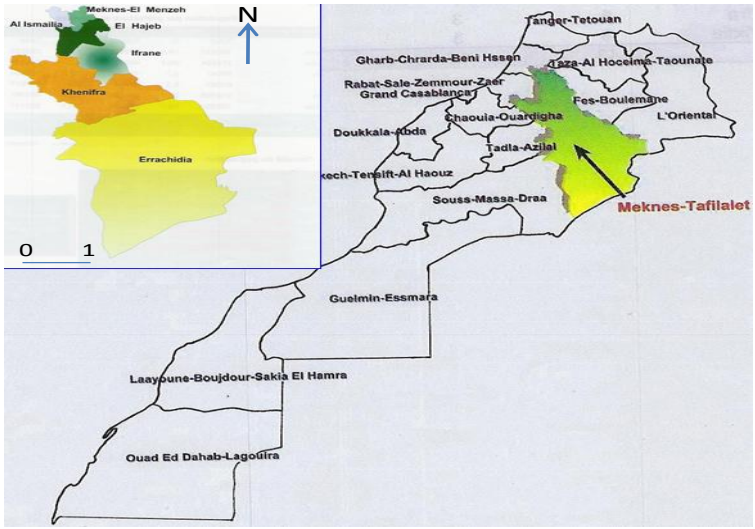

Figure 1: Province of the El Hajeb

Table 1: Typology of the agricultural exploitations

Size	Number	%	Area (ha)	%
0-5 ha	6143	45	14.600	10
5-10 ha	3617	26,5	21.900	15
10-20 ha	2252	16,5	27.700	19
20-50 ha	1229	9	30.700	21
50-100 ha	273	2	14.600	10
> 100 ha	136	1	36.500	25
Total	13650	100	146 000	100

Source: Provincial Departments of Agriculture of El Hajeb [14].

This study is based on an analysis of the database of the Provincial Directorate of Agriculture (PDA) of El Hajeb. It documents the exploitations that have received from the state aid under of agricultural development fund. This database contains several projects presented at this PDA (2008-2012). It received their subsidies during those five years. The analysis does not take into account the past achievements of 2008 (investment, grants and areas already equipped with drip; Figure 2). The investment treated in our study does not include the various charges related to vegetal and animal production.

Figure 2: Drip irrigation

Statistical analysis
Data processing was performed by a descriptive analysis via XL-Stat.

Results and Discussion
Global situation of investment and grants (2008-2012)
Private investment constitutes a powerful catalyst of the innovation, economic growth and poverty reduction [17].

The implementation of programs of the Morocco green plan is based, to a large extent, on the financial incentives granted by the State to agricultural producers. Indeed, the latter have continued to evolve over the years [18-19].

In our study of the period 2008-2012, the private investment in the agricultural sector reached 837 million dirham whose 316 million were supported by the State. The hydo-agricultural development and land improvements alone account for almost half of investment and 60% of grants (Table 2).

Table 2: Investment and subsidies of the State in the El Hajeb's province (2008-2012)

Objet	Investment amount (dh)	subvention amount (dh)	Pourcentage
Hydro-agricultural development and Improvements amelioration	384 280 604.95	188 357 461.48	49.02
Intensification of animal production	51 981 691.72	5 820 316.66	11.2
Intensification of vegetal production	401 511 660.81	122 067 586.09	30.4
Total	837 773 957.48	316 245 364.23	37.75

The intensification of vegetal production was classified in second position with 30% of investment amount and 38% of subventions; this component includes the material agricultural, the use of hail netting, the creations of olive orchards, the olive oil exploitations and the installation of recovery units.
Finally, the intensification of animal production comes with an amount of investment of nearly 6 million dirham equivalent to 11% of global investment and 2% of subventions. This section contains the genetic amelioration, the building construction and the material acquisition for breeding.

The amount of subvention becomes very interesting since 2010 to incite farmers to engage in it. The private investment has increased by 5 times in the last five years. It passed from 38 million in 2008 to over of 258 million Dhs in 2012 (Figure 3). In similar, the aid accorded to farmers is to increase significantly (17 million of Dhs in 2008 to more than 110 million Dhs in 2012).

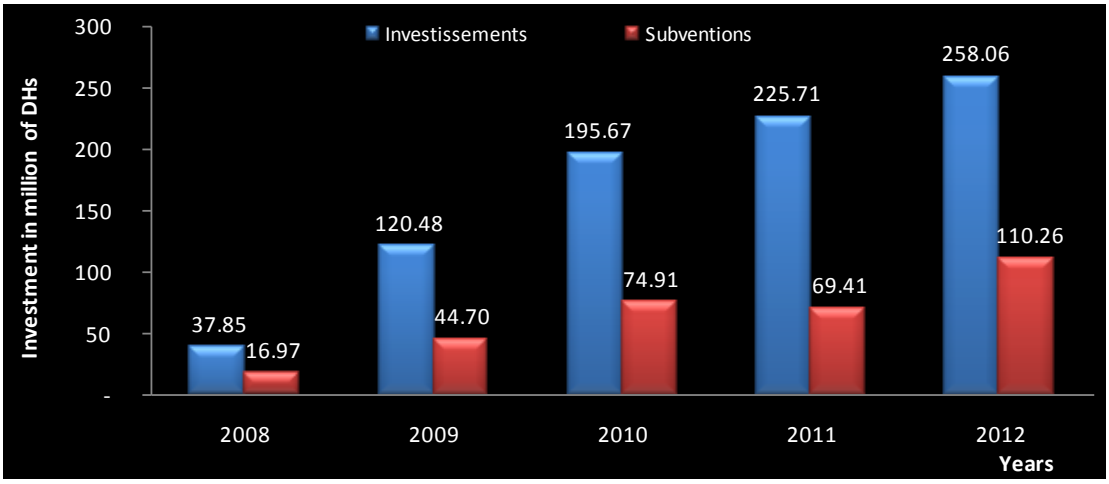

Figure 3: Evolution of investment and subvention of the stat (2008-2012)

The distributions of subventions for agricultural exploitations are huge disparities appear. Thus, large exploitations whose the funding capacity is important benefited nearly 37% of subventions allocated to the El Hajeb province. While these exploitations represent only 1% of this exploitations in total. Small farmers (the area is <5ha and represent 45% of the global amount) received only 8.5% of aid of the state (Figure 4).

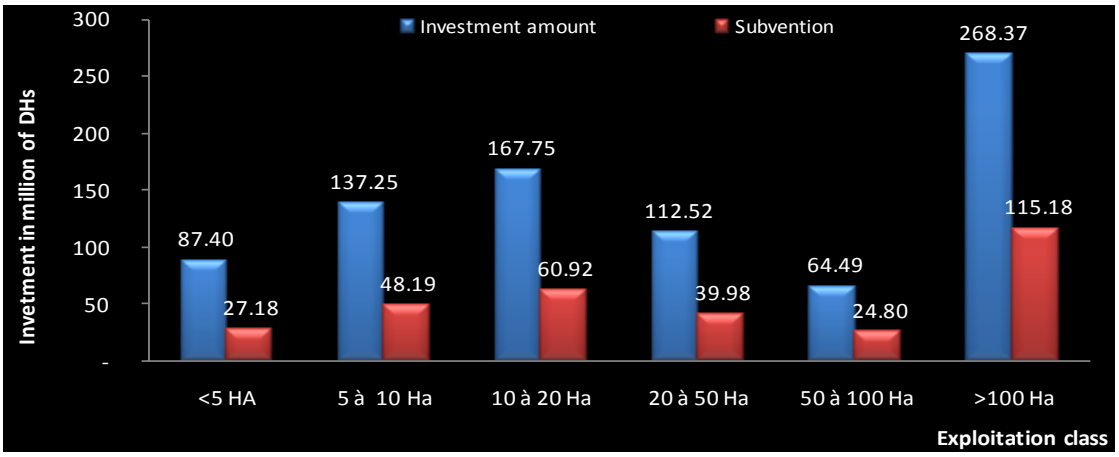

Figure 4: Investment and subventions by size of exploitations

Subventions are accorded only after realization of the project and approval by the administration. If the subvention constitutes substantial aid it does not help enough for many small farmers viewed funding difficulties (high rate of bank credit).

Status of investments and subvention by projects type
Intensification of vegetal production
The subventions of agricultural material represent two thirds of aid accorded to this category, followed by recovery units for agricultural products. The exploitation of olive oil comes in last with more than 7 million Dhs of subventions (Figure 5).

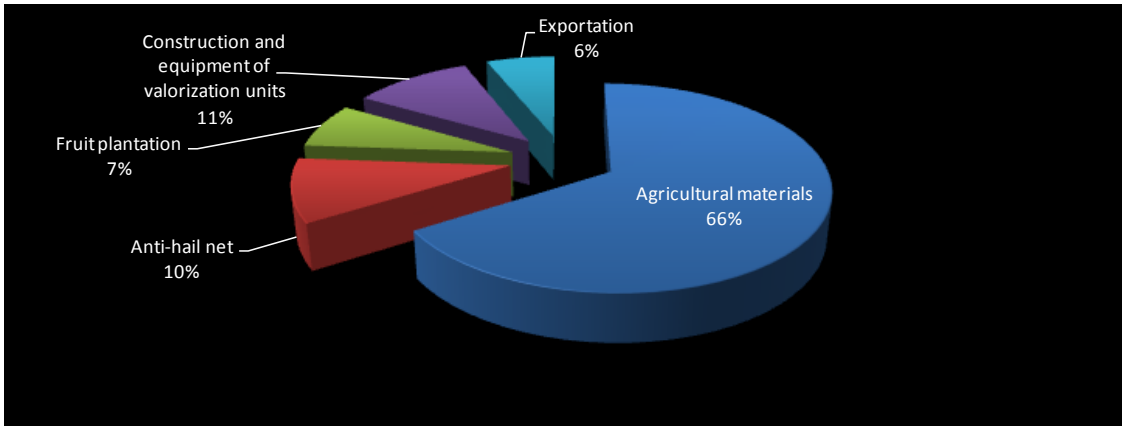

Figure 5: Distribution of subventions for vegetal production by component (2008-2012)

The distribution of subventions of the intensification of vegetal production per class of the area shows that large exploitations received more 30% of global aid in this topic. The breakdown of this aid per component is out that this class has received 100% for exploitation, 16% for recovery units, 82% for olive plantation and 23% for exploitations equipment at agricultural material and hail netting to plantations protect.

Equipment of exploitations in agricultural materials
The main investments of the exploitations in equipment related to the acquisition of tractors with 698 new units, equipment of working the soil with 591 units and equipment phytosanitary treatment with 389 units. These three types represented more of 90% of the investment and subvention amount (Table 3).

Table 3: Distribution of subvention of the agricultural Equipment by Type (2008-2012)

Objet	Nomber	Investment amount (Dhs)	Subvention amount (Dhs)
Tractors	698	164 240 941	54 197 136
Working equipment and soil's maintenance	591	19 080 493	6 150 823
Equipment phytosanitary treatment	389	24 373 968	13 059 445
Seeding equipment	98	7 087 469	3 740 628
Others	185	15 207 039	3 537 019
Total	1 961	229 989 911	80 685 050

Valorization units

During in this past five years, the province of El Hajeb has 16 units of new valorization and extension of two units. The installation of these units required an important investment of the 108 million dirham. The state has subsidized these units about 10% (Table 4).

Table 4: Units of subsidized valorization (2008-2012)

Type	Nomber	Capacity	investment amount in dhs	subvention in dhs
stations of conditions	2	4 T/H	5 801 067	515 175
Units of cold storage of agricultural products	12	55709,6 M3	66 856 182	10 388 260
Crushing units olive	4	294 T/J	36 018 957	1 989 249
Total	18		108 676 205,87	12 892 684

These investments have significantly improved the storage of fresh products with a global capacity of 56000M^3.

Anti-hail net

The subvention of anti-hail came into force in 2011, and since then, the farmers have invested an amount 34 million in Dhs to equip 290 ha mainly for protect the vine table. The aid provided by the State was of the order of 12 million Dhs.

Note that, the subvention rate for one hectare equipped on anti-hail net is 40% of the investment amount with a ceiling of 50 000 Dhs per hectare [2].

Plantation

The area of subsidized olive from 2008 to 2012 is 2088 ha, with a total of nearly 8 million dirham, distributed among 1374 ha for irrigated and 712 ha for bour (Table 5).

Table 5: State of the areas and subvention of the fruits plantation (2008-2012)

Type	Area (ha)	Investment amount in dhs	Subvention in dhs
citrus	5	74 520	43 200
olive irrigated	1 376	21 938 458	6 121 024
olive in bour	712	7 204 162	2 603 752

From 2008 to 2010, state aid in the creation of olive groves was as an investment premium (2600 Dhs per ha for Irrigated and 1300 Dhs per ha for bour). From 2010 to today, the aid is granted in the form of block grants to the hectare.

Exportation

The entry into force of the subvention (exportation promotion of agricultural products) was in 2011. Only olive oil was subsidized in the province of El Hajeb.

The quantity exported since 2011 was 3719 tones and has benefited more than 7 million Dhs of subvention.

Intensification of animal production

Investment of farmers from 2008 to 2012 for the intensification of animal production was of the order 54 million Dhs (Table 6).

Table 6: Distribution of subvention of the animal production by component (2008-2012)

Objet	Investment amount in dhs	Subvention in dhs
Genetic amelioration	13 026 625	2 549 000
Rearing Equipment	2 111 450	661 030
Rearing building	36 843 617	2 610 287
Total	51 981 692	5 820 317

The genetic amelioration has industrial crossing, breeding cattle production and the acquisition of imported heifers. Indeed, 285 heifers were imported since 2011 requiring an investment of nearly 8 million Dhs with state support of the order 1.12 million Dhs.

For buildings of the rearing, farmers have built 25 sheepfold housing 3546 heads of sheep and 87 stables housing 3486 heads of cattle.

Conversely to the situation of the vegetal production, for the rearing, the farmers (the area is <10 hectares) have benefited more than 50% of subvention distributed between 74% for the stables rearing, 67% for equipment and 22% for genetic amelioration.

The stables constitute for small farmers a non-cash capitalization or as a mobile cash to finance agricultural activities.

Hydro-agricultural planning and land improvements

National Program of Water Saving in Irrigation (NPWSI) is designed to meet requirements of sustainable development of irrigated agriculture by producing more with better quality and with less water. The priorities concern, inter alia, on the economy and the valuation of water, increased agricultural production, its valuation and improvement revenues of farmers [19]. The overall cost of this program, launched in 2007 for duration of 15 years, was estimated at nearly 37,000 billion of Dh which near 80% for physical investments and 20% for institutional measures and capacity building. Rates of return were estimated at 18.4 per cent for financial profitability and 22.4% for the economic profitability [20]. This program consists of massive conversion of irrigation surface and spray to localized irrigation, with a rate of equipment of more than 37.000 ha/year. It covers an area of 555.090 Ha.

The conversion of gravity irrigation to localized irrigation has been excitement in the province of El Hajeb. From 2008 to 2012 approximately 7330 additional hectares were equipped with drip, requiring an investment of 317 million of Dhs and benefiting from substantial aid of 175 million of Dhs (Table 7).

Table 7: Distribution of planning subventions by component (2008-2012)

Opération	Irrigated area	Total amount of the investment (dhs)	Aid accorded by the state (dhs)
Excavations wells	-	1 611 345.00	450 157.50
Irrigation	7 330.89	315 341 936.62	174 389 277.87
Stoning	2 232.71	67 327 323.32	13 518 026.11
Total	-	384 280 604.95	188 357 461.48

This investment includes the construction of 93 storage basin with a retention capacity of 975 000 m^3.

The irrigation of this area has required the use of 753 of elders water points (wells and drilling) and digging 218 of new water points.

The importance of subventions for hydro-agricultural planning, which can reach up to 51000 Dhs with the construction of a basin, had an accelerating effect for the installation of localized irrigation [2]. The area equipped drip was quadrupled in five years passing from 564 ha in 2008 to 2206 ha in 2012 (Figure 6).

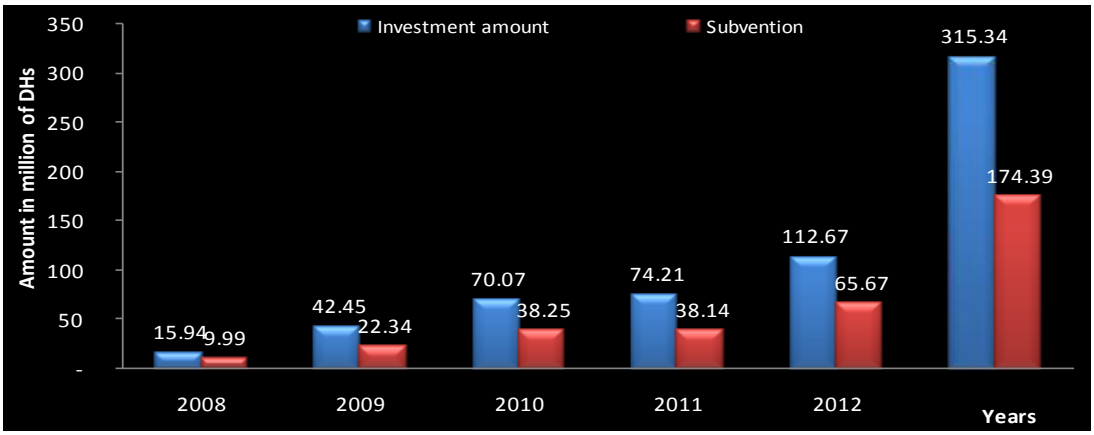

Figure 6: Evolution of investment and subsidies of the hydro-agricultural planning (2008-2012)

Equipped cultures with drip

Irrigation projects were mainly concerned the gardening (35%), the Rosaceae (25%), the olive (25%) and the vine (14%) (Figure 7).

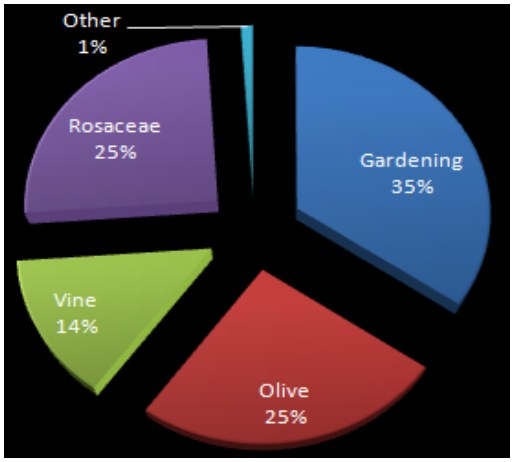

Figure 7: Distribution of equipped areas in drip by cultures (2008-2012)

Characterizations of subventions by exploitations size

The large farmers were equipped with nearly 44% of the total area on localized irrigation and they were benefited 42% aid of the state.

Small farmers equipped with only 6% of the area although the rate of subvention for irrigation projects for this exploitations size is 100%. This can be explained by the difficulty of funding to release this type of the project before to receive the aid of the state (Table 8).

Table 8: Distribution of subventions by cultures and by exploitations type (2008-2012)

Class of exploitations (ha)	**Irrigated in ha**	**Investment amount KDHS**	**Total aid KDHS**	**area of the practiced cultures (ha)**				
				gardening	**olive**	**vine**	**Rosaceae**	**other**
<5	416.03	25.26	12.22	316.62	27.76	6.62	58.73	6.3
5-10	1001.89	49.06	26.02	711.69	69.72	59.02	158.45	3.01
10-20	1257.01	58.37	30.33	849	41.87	72.76	293.38	-
20-50	898.95	36.59	19.39	367.06	105.69	103.16	310.04	13
50-100	555.99	24.31	13.61	89.2	106.22	38.13	322.43	-
> 100	3201.02	123.34	73.26	203.34	1509.37	735.83	700.72	51.76
Total	7330.89	316.95	174. 84	2536.92	1860.63	1015.52	1843.75	74.07

Localized irrigations is risky for two reasons: technically, you must master irrigation practices new or conduct new cultures, and financially because it requires a significant investment and leads farmers to insert in less secure markets [21]. The second observation is that the area of gardening equipped in drip decreases the exploitation size (<5ha) to the class more than 100 ha. However, the arboriculture increases the small exploitation to more exploitation. The arboriculture requires an important investment before receive the first results, and exudes a profitability important than the gardening.

Conclusion

With the advent of the Green Morocco Plan, which aims to remove constraints to the development of a competitive agriculture, an overhaul of agricultural incentive system had an accelerating effect on subventions demand for farmers. The quantitative results obtained in the province of El Hajeb are very satisfactory on the intensification of the animal and vegetal production. Faced with the difficult situation of groundwater resources that don't continue to worsen, water economy is a major axis of the Green Morocco Plan. The important participation of the state at exploitations investment for the installation of the drip encourages farmers to implement irrigation techniques. The area equipped for irrigation was localized quadrupled in the past five years in the province of El Hajeb.

However, this increase of the irrigated area and intensification of vegetal and animal production was caused a pressure on the groundwater. Studies conducted by the agency Sebou Basin have shown that exploitation of groundwater is greater than their natural diet. The groundwater quality deteriorates from one year to another, which could jeopardize the economic activities related agriculture.

Finally, Balancing agricultural modernization to ensure a pace sufficient economic growth and protection of water resources is a key imperative for sustainable development.

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