

## Study of the Factors of Degradation of the Culture of the Apricot Tree in the Area of Boukhmissa, Zone of Hodna, Wilaya of M'sila

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**Abstract:** The culture of the apricot tree in the area of Boukhmissa, wilaya of M'sila passes by one critical period which requires an immediate rectification; this degradation is due to several factors of a nature ecological, agronomic, economic and social. The climate change, the water quality of irrigation and the absence of a network of drainage are among the ecological elements which worsen this situation. The agronomic factor contributes in a direct way to this decline as the lack of diversity in varieties, the ageing of the orchards of apricot trees and the ignorance of the modern farming techniques by the farmers of the area. The lack of maintenance of the orchards is due to the economic factor because of the dearness of the products necessary like to their scarcities on the local market. Finally the social factor which will worsen even more this situation, because of the division continual of the orchards between heirs, the ageing of the hands of open specialized, the exodus of the young farmers towards other less painful activities and the last element it is the invasion of the masonries on the orchards, which will reduce way marked the surfaces devoted to the culture of the apricot tree. All these factors can cause a total renunciation of the orchards of apricot tree, which will end up disappearing with the profit from the urbanization or the replacement by other plant species like the olive-tree or cereals.

**Key words:** Apricot tree • Boukhmissa • Factors of degradation • M'sila • Arboriculture

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### INTRODUCTION

The culture of the apricot tree, installed since decades in certain areas of Algeria, strongly regressed with the courses of the last years is that is due to the lack of care and maintenances of the trees and the absence of the application of modern technologies of control of the orchards. The apricot tree is cultivated primarily for its fruit, which can be consumed in expenses or transformed.

According to Bouzidi [1], the culture of apricot tree in Algeria, in spite of the progressive increase in the surfaces, presents one year a very important regression of the output to another, which can be due to the lacks of maintenance and the ageing of the orchards as well as the absence of plant health treatments.

The zone of Hodna, is one of the most important areas of Algeria which conceals the most appreciated varieties of apricot tree, like: Tounsi, Bulida, paviot, red

Louzi. These last years the culture of the apricot tree in the area of Boukhmissa, passes by one period of continual degradation which intensifies more and more, due to various parameters of an ecological nature, agronomic, economic and social.

### MATERIALS AND METHODS

Multiple exits on ground were carried out in order to detect the constraints which block the good development of the culture of apricot tree on the levels of the orchards of the area of Boukhmissa as well as questionnaires addressed to the farmers to know their concerns and the problems practical which slow down the good behaviour of their orchards.

On the basis of general diagnosis of the various constraints of development of the apricot tree, one could include four independent factors of various types: ecological, agronomic, economic and social.

## RESULTS AND DISCUSSION

The various constraints which face the good development of the culture of the apricot tree in the area of Hodna can be encircled in several factors:

### Ecological Factors

**Hydrous Erosion of the Edges of El-ksob River:** The area of Boukhmissa being at the edges of two banks of the El-Ksob River is constantly victim of collapse of enormous quantities of ground, causing the loss of the fertile hectares of grounds. This loss is due to the continual widening of bed of the river which intensifies at the time of the torrential rains and the great risings, especially with the absence of the plantations of forest trees at the edges of the river which can fix the ground. This phenomenon developed with the fragile geological constitutions of the grounds, which are regarded as old, formed alluvia of sandy clay or silts.

**Water Quality of Irrigation:** When the apricot tree is cultivated in the clay soils flooded by a water excess, the tree will be exposed to all kinds of diseases, with a great risk of asphyxiation [2]. Irrigation carried out during summer, can remove the accidents due to the dryness and regularizes harvests and the outputs as well as the size and the quality of the fruits [3].

The water of the stopping is fed by El-Ksob river which drains water of the affluent of the south-western zone of the wilaya of Bordj-Bou-Argeridj, presents pollution in heavy metals in particular lead (Pb) and cadmium (Cd). This pollution is described as bad according to a study carried out by AGGOUNE and SAFER [4]. An analysis of water of El-Ksob river was carried out by the regional office of water in 2005 gave the following results:

The pH of the water of the stopping is of 7.42, it is a tolerable median value for a water of irrigation which must be between 6.5 to 8.4. The conductivity which is about 1583 ms/cm is regarded as moderated in accordance with the allowed standards in irrigation; the irrigation with this quality of water thus involves risks of salinity especially in absence of a network of drainage in the orchard. Turbidity is of 10.3 NTU is very acceptable since the standard is between 0.2 to 35 NTU (Table 1), because a high value of turbidity can involve the obstruction of the systems of irrigation especially of type drop by drop.

The concentration of the total coliformes is very high of about 9200 CFU/10ml, sight the standards which are between 1 to 200 CFU/10ml, this water is thus regarded as

polluted with a high risk of pathogenic microbes. The nitrite, ammonium rates, nitrates and of Orthophosphates are very weak concentration, which minimizes the position risk due to these elements. The biochemical request oxygenates some (DBO<sub>5</sub>) is very of strong concentration with 150 Mg of DBO<sub>5</sub>/l, the standard is between 5 to 45 mg/l, which implies the strong presence of organic substrate for the bacterial growth, in this case water is very polluted and unsuitable with the irrigation (Table 1).

**Climate Changes:** The temperature intervenes according to two modes; actions on the buds, low temperatures for the lifting of dormancy and the temperatures higher to support evolution of the bud [5].

Climate warming that the world undergoes to cause precocity in opening of the buds and flowering, which returned the trees increasingly exposed to the effects of the late frosts, which make considerable damage on the fruit yield.

A study carried on the four varieties of apricot tree the most answered Boukhmissa, over three consecutive years from 2005/2006 to 2007/2008, showed that the climate change with caused a precocity of about 20 days for the whole of the stages phenologic and the whole of the varieties tested, which exposes the more marked trees of way to the climatic risks, especially the low frosts and temperatures, causing important falls of flowers which reduces considerably the output fruits by tree (Table 2). According to CONTANCEAU [6], the frosts of spring are most dangerous because they coincide with the departure of the vegetation thus causing the destruction of the buds, the flowers and the young fruits.

Precocity in opening of the buds of the buttons with one year old flowers to another is mainly due to the reduction in the cold days, which tend to slow down opening of the buds, this number was 48 days in 2005, then it has to strongly decrease to reach only 11 days in 2007, which exposed the buds to a heat which supported an acceleration of this phenomenon (Table 3).

**The Cleansing and Rejections of Waste Water:** Until now, the area of Boukhmissa does not have a network of cleansing unceasingly and seen the big number of population in evolution, caused a discharge of waste water towards the orchards of neighbouring apricot trees, or in the El-Ksob river which its water will turn over to the orchards by the irrigation. This phenomenon involved the appearance of many diseases causing the deterioration of the trees, this situation worsened with the anarchistic urbanization whose its extension was with depends on the orchards of apricot tree.

Table 1: Physicochemical analysis, indicators of pollution and bacteriology of Water of the El-Ksob stopping, date of taking away: 15/05/2005

Physicochemical parameters	Concentration
PH	7.42
Conductivity ms/cm	1583
Turbidity NTU	10.3
Indicators of Pollution	Concentration
Ammonium mg/l	3.55
Nitrite mg/l	0.92
Nitrates mg/l	0.02
Orthophosphates mg/l	0.273
DBO <sub>5</sub> mg/l	150
Bacteriology	Concentration
Coliformes totals /100 ml	920000

Source: E.P Algerian of water; Regional office of water; zone of Algiers.

Table 02: Comparison between years of the various Phenological stages of the tree of the four varieties most answered in the orchards of Boukhmissa.

		Stage A	B	C	D	E	F	G	H	I	
Var	Tounsi	Y <sub>1</sub>	09/02/06	10/02/06	11/02/06	15/02/06	22/02/06	25/02/06	13/03/06	17/03/07	19/03/06
		Y <sub>2</sub>	07/02/07	09/02/07	10/02/07	14/02/07	19/02/07	22/02/07	12/03/07	15/03/07	17/03/07
		Y <sub>2</sub>	20/01/08	25/01/08	30/01/08	07/02/08	12/02/08	17/02/08	21/02/08	28/02/08	10/03/08
Bulida	Y <sub>1</sub>	Y <sub>1</sub>	18/02/06	21/02/06	24/02/06	25/02/06	01/03/06	09/03/06	12/03/06	18/03/06	27/03/06
		Y <sub>2</sub>	14/02/07	18/02/07	22/02/07	24/02/07	28/02/07	07/03/07	12/03/07	17/03/07	20/03/07
		Y <sub>3</sub>	26/01/08	02/01/08	09/02/08	14/02/08	18/02/08	23/02/08	28/02/08	06/03/08	15/03/08
Paviot	Y <sub>1</sub>	Y <sub>1</sub>	15/02/06	19/02/06	25/02/06	26/02/06	03/03/06	10/03/06	13/03/06	17/03/06	28/03/06
		Y <sub>2</sub>	12/02/07	16/02/07	23/02/07	24/02/07	01/03/07	08/03/07	10/03/07	15/03/07	23/03/07
		Y <sub>3</sub>	08/02/08	14/02/08	21/02/08	23/02/08	28/02/08	03/03/08	06/03/08	09/03/08	20/03/08
	Red Louzi	Y <sub>1</sub>	07/03/06	10/03/06	13/03/06	16/03/06	18/03/06	25/03/06	03/04/06	10/04/06	13/04/06
		Y <sub>2</sub>	05/03/07	08/03/07	12/03/07	14/03/07	16/03/07	23/03/07	01/04/07	06/04/07	10/04/07
		Y <sub>3</sub>	21/02/08	28/02/08	06/03/08	10/03/08	14/03/08	18/03/08	22/03/08	27/03/08	07/04/08

Y<sub>1</sub>: Year 2005/2006,

Y<sub>2</sub>: Year 2006/2007,

Y<sub>3</sub>: Year 2007/2008.

Table 3: Number of days, annual and monthly whose temperature is lower than 7,2 C°.

Year	Number of days lower than 7,2 C° in the year	Month	Number of days lower than 7,2 C° in the month
2005	48	January	21
		February	14
		March	03
		November	02
		December	08
2006	22	January	14
		February	04
		December	04
2007	11	January	03
		February	03
		December	05
2008	09	January	05
		February	02
		March	02

### Agronomic Factors

**Miss Varieties and of Genetic Diversity:** Bretaudeau [7] established two classes of varieties of apricot tree, the first class of varieties of great farming

interest, having to be used as a basis for the fruit-bearing production, the second class of varieties of more local interest or clones, which show special characteristics.

Table 4: Comparison between variety for the date of flowering and maturation

Varieties		Date of Flowering	Date of Maturation
Tounsi		17 / 02 / 2008	29 / 04 / 2008
Bulida		24 / 02 / 2008	11 / 05 / 2008
Paviot		04 / 03 / 2008	14 / 05 / 2008
Red Louzi		19 / 03 / 2008	20 / 05 / 2008

Table 5: Distribution of the orchards of apricot tree according to the old one of the trees in the area of Boukhmissa

Old of the trees	Percentage (%)
Lower than 10 years	30
Between 10 to 30 years	45
Superior at 30 years	25

There exists all over the world, in addition to the fixed varieties, a big number of population. This diversity is related to the fact that the principal mode of propagation of the apricot tree was up to one recent time, the sowing, which allowed the appearance of many types among which only best adapted remained. Those are in the beginning new hybrids registered with the catalogues of the varieties and cultivated species [8].

Most of the Algerian production of apricots is ensured by population's varieties like red Louzi and Mech-mech, the latter is a form of apricot tree multiplied by sowing [9]. One finds a number impressing of varieties whose influence is limited often only to the area where it is cultivated [10].

The area of Boukhmissa has a range of very reduced varieties (6 to 7 varieties), with a genetic variability very brought closer, the cycle of vegetation and of fructification between opening of the buds and the maturation of the fruits is of very short duration of about 60 days for each variety, of February 24 to May 11 for the variety Bullida, that is due to the temperatures of end of cycle, which increase considerably thus reducing this cycle. This phenomenon is followed by a regrouping of the date of maturity which is limited to 20 days, of April 29 for the early variety Tounsi at May 20 for the varieties late red Louzi, the presence of apricots at the market east of this fact of short duration (Table 4).

This situation is due to the disappearance of some cultivars and others are threatened of disappearance. In the area of Boukhmissa one estimates at six, the number of cultivars completely disappeared and with ten in way from extinction. What led to the plantation of a reduced number of varieties, leaving little choice to the farmers.

**Ageing of the Orchards:** The age group of the trees most answered in our area of study ranges between 10 to

30 years, more than 65% of the trees exceeded their break-even points (Table 5). The various existing varieties in the area of Boukhmissa pass their stages phenologic to different periods, but the age of the tree does not seem to have of effect on the expression of the variety.

The young trees (5 years) have a percentage of flowering and of formation of the fruits lower than that of the 19 year old trees; these trees seem to be interested more to increase their vegetation with the profit of fructification. The old trees whose rate of flowering is high record a rate of fall of flowers and young fruits highest, especially for the early varieties (Table 6).

The high fall of the young fruits is due to the coincidence of flowering with the cold ones, which will cause an important fall of the flowers, as well as the lack of maintenance of the trees, the diseases and the presence of the intercalated cultures between the trees of the orchard.

The important fruit falls which the old trees led to poor yield by tree undergo, that is pronounced more at the Bulida variety with 82,90% at the old trees compared with 68,81% at the young trees. The age of the tree seems to have a very great importance in the form of the trees with respect to this factor (Table 6).

**Ignorance of the Farming Techniques:** The culture of the apricot tree is practised in the area of Boukhmissa since decades, some to know to make old is transmitted of a generation to another, without taking account of the progress made in the world like:

**Size:** apricot tree with a natural tendency has to fall down and has to spread out, the size will avoid the formation of re-entrant angles and branches as regular will be formed as possible in order to facilitate the circulation of the sap [11], this technique is neglected by our farmers.

Table 6: Comparison between varieties and between old for the percentage of flowering and fall of the fruits

Variety	Old	Percentage of flowering (%)	Percentage of fall of the fruits (%)
Tounsi	1	87.80	66.67
	2	84.43	62.69
Bulida	1	95.71	82.90
	2	95.26	68.81
Paviot	1	98.76	58.62
	2	93.93	51.32
Red Louzi	1	80.95	50.00
	2	66.66	23.81

1: The 19 years old trees planted in (1989). 2: The 5 years old trees planted in (1993)

Table 7: Distribution of the orchards of apricot trees according to their surfaces in the area of Boukhmissa

Surface of the orchards	Percentage (%)
Small orchard lower than 2 hectares	68
Average orchard between 2 to 5 hectares	21
Large orchard higher than 5 hectares	11

**The Polishing of the Fruits:** polishing of the fruits appears useful in the event of strong formation of the fruits and when the trees are particularly charged, it allows to obtain larger fruits while holding a very suitable harvest and presents favours not to compromise future bus of excessive harvests are likely to cause weakening of the trees and alternation [12]. This polishing with a direct influence on the rate of the sugar contained in the fruit, because more it early carries out more index refractometric is high [13]. The farmers of Boukhmissa tend to leave their fruit trees very charged to guarantee a good production.

**Fertilization:** l' apricot tree with its very wide radicular system draws from the ground of the significant amounts; fertilizing elements but more the share of the grounds are insufficiently provided what obliges nurseryman has to resort to use of manures [14]. Unfortunately the ground of Boukhmissa is very low in nutritive elements and the recourse to the fertilization is not easy.

**The Application of the Specific Plant Health Treatments:** In the area of Boukhmissa, the apricot tree is especially sensitive to the Mediterranean fly on fruits and the capnode on root.

**Ploughing:** In the areas of traditional cultures of apricot tree, the ground is maintained clean by repeated farming ways, this method is justified by requires to remove the competition of bad grasses, it presents disadvantage of deteriorating the structure of the ground [15]. This method however traditional is not applied by touts the farmers of the area of Boukhmissa.

As well as other farming techniques like, the irrigation tastes with tastes, the ferti-irrigation and the drainage.

The ignorance of these techniques by the nurserymen will generate a bad conduct of the trees of apricot tree, inducing degradation and a renunciation of the orchards, which will cause a considerable fall of the output of the trees.

**Weakness of the Output and the Production:** To have a range of very reduced varieties with maintained age groups of the trees very advanced in male orchards forcing of the falls of very important fruit yield of the trees involves.

#### Economic Factors

**Miss Maintenance of the Orchards:** The dearness of the inputs like the high price of electricity, the use of pesticides, artificial fertilisers and organic, the plant health treatments, the installation of a system of irrigation tastes with tastes and of a network of cleansing and drainage obliges the farmers, whose financial means is weak, of satisfied with the possible minimum like the use of organic manures containing dung of cow or of the poultry droppings, the irrigation by immersion and of the ploughings in order to fight against the adventitious ones.

**Supply Maintenance Products of the Orchards:** The lack of maintenance of the orchards returns mainly to the weak procurement of products on the national market, necessary for a good behaviour of the orchards, which

will slow down the execution of the various farming operations. The plant health pesticides and products and manures are absent or inadequate with the conditions of the farming medium of the apricot trees of the area of Boukhmissa.

### **Social Factors**

**The Division of the Grounds Between Heirs:** The division continual of the cultivated pieces, 68% of the orchards are lower than 02 hectares (Table 7), has to generate dispersions of the knowledge to make, the owners are less and less professional. The orchards became heterogeneous point of view, varieties, the shape of the trees and density of plantation. This situation will make more difficult the homogenisation of a mode of control common for tous the orchards.

**Ageing of the Local Farmers:** The knowledge to make local populations is in the process of disappearance, the farmers are increasingly old and with the refusal of the young people to work the grounds, traditional husbandries are little to develop, which will cause the loss of old very important practical knowledge to rectify this culture very difficult to carry out.

**The Exodus of the Young Worms of Other Activities:** The agricultural sector in general and arboriculture in particular life a period of refusal of the young generations, very accentuated towards less painful activities and with a faster benefit like the trade, industry or transport. This situation involved an abundant total of the orchards, the old trees are not replaced by young trees, negligence of the operation cuts, the ground is not ploughed regularly, the orchard is thus infested the adventitious ones. The young farmers have tendency replaced the apricot tree by other fruit-bearing species less demanding in permanent labour like the olive-tree primarily.

**Arboriculture Lack of Specialized Popularization:** Modern technologies of conduits of the arboriculture orchards as the size, the irrigation by tastes with tastes, of new pesticide or of weed killers, as well as the test of new varieties of apricot trees or even the creation of more adapted varieties, male or are not known by the nurserymen of the area for lack of popularization. This lack is due to a defect of coherence between the services concerned with this popularization and the nurserymen.

**The Invasion of the Masonries on the Orchards:** The population of the area of Boukhmissa with passed from a few hundreds of individuals in the years 1990 to 4435

inhabitants in 2008 is a density of 20,8 habitants/ha, concentrated especially at the roadsides N°45. This unceasingly increasing demographic pressure generated the construction of new masonries with depends on the orchards of apricot trees leading to a vegetable destruction of cover through the years. Considering the very difficult conditions of cultures of the apricot tree, the concrete still will strangle reserved space with the trees, which can cause its final disappearance.

### **CONCLUSION**

The culture of apricot tree in the area of Hodna passes by one critical period, which led to a continual degradation of the orchards, which intensifies one year to another. Several factors intervene with this deterioration which are of order ecological initially climate changes which made the trees increasingly early, which expose them still more to the effects of the late frosts, as well as the problem of absence of a network of cleansing of waste water that the population pour in the orchards and water of the El-Ksob river.

The agronomic factor plays a very important part in this critical situation, by the obvious lack of varieties, the little of existing varieties behaves in a similar way and passes the phenological stages at the same time, which minimizes the choice of varieties, in addition to the ageing of the trees or more than 65% exceeded the stage of maximum break-even point.

From economic point of view, the scarcity of the pesticides and plant health products adequate with the culture of the apricot tree as well as the dearness of the installation of a network of irrigation and system of drainage with forced the farmers carried out the orchards in a traditional way.

With dimensions social one worsened the situation of the apricot tree because of the division of the pieces between heirs, which caused heterogeneity in the mode of control of the orchards, as well as the refusal to the young worms to other activities less painful than arboriculture. The invasion of the frames still deteriorated this situation especially with the increase in the population, which narrowed in a marked way the surface of the orchards.

All these various factors will compromise the presence of the culture of the apricot tree in the area of Boukhmissa, of which the surface is in continual regression, making place either with the dwellings or with other fruit-bearing species, like the olive-tree primarily.

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