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Durum wheat yield sustainability or ecosystem sustainability?: Effects of state policies on farmers' behaviour in Algeria

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SUMMARY – Durum wheat is a basic staple food in Algeria. Since the independence, state agricultural policies, aiming at improving the level of durum wheat output, introduced distorting incentives and caused a farmer negative behaviour towards natural resources. Being conceived and implemented upon a standardised manner, these policies yielded a dramatic degradation of the ecosystem, as it has been reported from many regions. The problem today is not how to achieve durum wheat yield stability and sustainability, if any. The main concern is how to maintain and conserve the ecosystem where durum wheat is grown. This paper aims to introduce two examples of ecosystems: one concerns the potential agro-ecological zones of northern Algeria, the other concerns the marginal lands in steppic and sub-steppic areas. In both ecosystems, durum wheat is cultivated either as a long tradition or as a consequence of standardised state policies. The paper's conceptual framework on sustainability focuses on the concept of the "critical triangle of sustainability" or "the 3E's of sustainability" (that are Efficiency or economic growth, Equity or poverty alleviation, and Ecology or environment conservation).

Key words: Durum wheat, Algeria, sustainability, policy.

RESUME – *"Durabilité du rendement de blé dur ou durabilité de l'écosystème ? Effets des politiques de l'Etat sur le comportement des agriculteurs en Algérie". Le blé dur est un aliment de base en Algérie. Depuis l'indépendance, les politiques agricoles de l'Etat, à la recherche d'une amélioration imminente et tangible de la production du blé dur, ont introduit des incitations "distordantes", causant un comportement négatif de l'agriculteur vis-à-vis des ressources naturelles. Ayant été conçues et exécutées d'une manière standardisée, ces politiques ont engendré une dégradation dramatique de l'écosystème, comme il a été rapporté dans plusieurs régions du pays. Le problème qui se pose aujourd'hui n'est pas comment peut-on atteindre une stabilité, et donc une durabilité, de la productivité du blé dur. Le problème majeur est plutôt comment maintenir et conserver l'écosystème dans lequel est produit le blé dur. Cet article vise à introduire deux exemples d'écosystèmes : l'un concerne les zones agro-écologiques potentielles de l'Algérie du Nord ; l'autre concerne les terres marginales des zones steppiques et sub-steppiques. Dans chacun de ces deux écosystèmes, le blé dur est cultivé soit comme une longue tradition, soit comme conséquence de politiques agricoles standardisées. Le cadre conceptuel de cet article en ce qui concerne la durabilité s'appuie sur le concept du "triangle critique de durabilité", connu aussi comme les "3E" de la durabilité (qui sont l'Efficience ou la croissance économique, l'Equité ou la lutte contre la pauvreté, et l'Ecologie ou la protection de l'environnement).*

Mots-clés : *Blé dur, Algérie, durabilité, politique.*

Introduction

Durum wheat is a basic staple food in Algeria for very large segments of the population. For many centuries, farmers and rural communities produced durum wheat for household consumption mainly. It was part of a subsistence agriculture. Since the French colonisation, commoditisation of agricultural products, in general, and of cereal grains, in particular, took place and influenced the appearance of a small but expanding commercial agriculture. This endeavour relied on the *colons* – European settlers – who created farms from the expropriated land in order to produce for the *métropole* markets.

At the independence time (1962), state agricultural policies, relying on the *autogestion* sector, aimed at improving the level of durum wheat output. Although these policies did not disturb much the cereal sector during the first years until the adoption and application of a largely standardised Green Revolution-like model of cereal intensification at the beginning of the 1970s. Based on a very rigid

commodity approach of research and development, this model distorted farmers' incentives and engendered a tremendously negative behavioural change among farmers *vis-à-vis* natural resources. While responding to the stimulus of these policies, some farmers sought the maximisation of their profit at the detriment of the sustainability of their ecosystem. It must be noted here that the issue of property rights and land tenure influenced remarkably these undertakings.

This paper intends to introduce the dilemma that is facing farmers and policy-makers altogether, that is: should durum wheat yield improvement and stability be our main goal? Or should the sustainability of the ecosystem wherein durum wheat is grown be the goal? Our main concern in this paper is not how to achieve durum wheat yield stability and sustainability *per se*, but how to make sustainable and conserve the ecosystem where this crop is cultivated. Anyone may say it is obvious that sustainability of durum wheat yield means the sustainability of the ecosystem. However, this is not always the case in reality.

In this respect, we shall introduce two case-studies which concern two different ecosystems where durum wheat is grown for a long period: the first concerns a region in northern Algeria and the consequences of a Green Revolution-like model of intensification and its underlying commodity approach adopted by R&D institutions; the second concerns the marginal lands in the steppic and sub-steppic areas and the consequences of standardised agricultural policies. But before that, we would first introduce the importance of cereals in Algeria, and attempt to elaborate our own conceptualisation of sustainability.

Importance of cereals and durum wheat

Since the independence (in 1962), agricultural policies aimed at improving the level of cereal output, in general, and of durum wheat, more particularly. Why especially cereals and durum wheat? According to Malki (1999), cereals are the main annual crops in the Algerian agriculture. Within this agricultural area, cereal crops annually comprise nearly 50% of the area, while the cereals-based farming systems (including cereals, pulses, forage, pastures and fallow) account for more than 90% of this area. According to MAP (1992), cereals provide 60% of the energy of the average nutritional diet in Algeria, 70% of the total proteins, and 88% of the vegetal proteins. But despite its large 'supremacy' within the agricultural sector and in consumption, the domestic overall production of cereal crops remains insufficient and does not cover more than 25-30% of the annual population needs. INVA (1997) reports that imported cereals raised up to 150 kg/inhabitant/year for an estimated consumption of 185 kg/inhabitant/year.

Among all cereals, durum wheat represents the major staple food for larger segments of the population. For this concern, the state had to maintain an equitable access to this strategic food for all. Given the low domestic production, massive imports of cereal grains are annually realised by the government from the world market. In this respect, the government has to yearly allocate US$ 2.5 billion annually to cover all its annual food imports, which represents not less than 25% of both Algerian total annual imports and foreign earnings. One-third of this amount is used to cover cereal imports. In the context of durum wheat, Algeria is the first importer in the world of durum wheat, purchasing 50% of the total world trade of this product annually (INVA, 1997).

Conceptualising sustainability: The 3E's best-ever trade-off

The end of the 20th century is characterised by an ever-increasing interest showed towards the concept "sustainability". This attention is too vivid although the term sounds more like a fashion than a concept which must organise the use and evolution of resources in meeting societal needs. This great attention cannot hide that, in terms of meaning, sustainability is a ship that sails under different flags, if we dare to rephrase Adams (1993). As a consequence, this creates confusion about another concept, that is "sustainable development" which can be better understood if one talks of the "sustainable patterns and processes of development" (Elliott, 1994). In fact, sustainability puts a great emphasis on the "environment" and its limited capacity. It shows the extreme interdependency between "development" and "environment" (Elliott, *ibid.*). Each of these concepts has been broadly used in literature, discourses, slogans, etc. to show that they sometimes mean different things to different people, depending on which side one is holding the stick or who is setting the agenda. This is to say that conceptualisation a given term requires the clear definition of the context of this conceptualisation. Many authors have proposed

a set of key words in order to attempt a working definition of sustainability. In the context of development, some looked at it from the human-being welfare point of view, arguing that it is a kind of development, according to Allen (1980, quoted by Elliott, *ibid.*), that, "is likely to achieve lasting satisfaction of human needs and improvement of the quality of human life". Others looked at it from the economic point of view, arguing, according to Turner (1988, quoted by Elliott, *ibid.*), that sustainability "would seek to maintain an "acceptable" rate of growth in per-capita real incomes without depleting the national capital asset stock or the natural environment asset stock". Others finally looked at it from the environmental point of view saying, according to Redclift (1987, quoted by Elliott, *ibid.*), that "the term suggests that the lessons of ecology can, and should be applied to economic processes". In this respect, it is suggested that human activities should use resources efficiently and that by-products or side-effects of these activities should not harm the environment. According to Adams (1993), sustainable development in this respect relies on two concepts: the first is the concept of basic needs and its corollary of the primacy of development action for the poor; the second involves the environmental limits. It prioritises political and economic changes to achieve sustainable development (Elliott, *ibid.*). This broad conceptualisation of sustainable development is corroborated by Tolba (1987, quoted by Elliott, *ibid.*), who suggests that sustainability encompasses, among others, help for the very poor because they were left with no option other than destroy their environment.

Summing up all these different conceptualisations, we suggest that sustainability cannot exclusively concern the economic dimension. On the contrary, it concerns the realisation, at a lower cost and a lasting maintenance, of the best-ever trade-off between efficiency (or economic growth), equity (or poverty alleviation), and ecology (or environment protection). These are the "3E's of sustainability" on which our future depends (Oram *et al.*, 1998). Seeking a lasting stability of an exclusive economic growth without paying attention to the social and environmental dimensions can never achieve sustainability.

Distorting incentives: The consequences of state interventions

In order to improve the cereals' output, in general, and durum wheat, in particular, the Ministry of Agriculture adopted different policies since the independence, and more particularly since the beginning of the 1970s when the *Projet Céréales* was started. In the following sections, we shall review two cases that will help us to define the framework of this paper, that is the dilemma between yield improvement and stability, and ecosystem sustainability.

Durum wheat improvement and commodity approach: Consequences on the environment

To give a great impetus to the cereal sector in the 1970s, the *Projet Céréales* gave birth to the *Institut de Développement des Grandes Cultures* (IDGC) which became in 1987 the *Institut Technique des Grandes Cultures* (ITGC). Based on a vertical commodity approach, this institution was in charge of tackling all constraints that was encountered by cereal producers, in general, and durum wheat ones, in particular. With a strong support and a significant input from the CGIAR-system International Center for Maize and Wheat Improvement (CIMMYT), based in Mexico, in terms of technical and scientific assistance, IDGC (or ITGC) adopted a Green Revolution-like model of durum wheat development in order to achieve a rapid improvement of durum wheat productivity. Over three decades of application of the so-called model, Algeria did achieve an improvement at the level of productivity, although the growth rate was slow. A recent study undertaken in the frame of the WANADDIN Project shows that durum wheat output increased at an average rate of 4.5% per year between 1973 and 1996. In absolute terms, the domestic average moved up from 0.67 MT/ha in 1978 to 0.9 MT/ha in 1995 (WANADDIN, 1999). This illustrates somehow the positive technological impact of the intensive model.

However, while focussing on that impact, the evolution of the environment was completely overlooked because the adopted commodity approach assigned the issues of environment protection to another institution's mandate. ITGC-IAO (1995), a recent study on natural resources that concerned 4 wilayate or provinces (Mostaganem, Relizane, Tiaret and Tissemsilt), revealed that only 9.5% of the total agricultural land of these wilayate is suitable for durum wheat cultivation (2.0% with a high potential and 7.5% with a moderate potential). However, the same land is subject to a heavy erosion, either water- and wind-led and could lose its potential if appropriate measures are not rapidly devised. At the delivery of this study, a long debate started whether ITGC should focus only on durum wheat yield improvement or

should it consider activities of land conservation and land-use efficiency. As a consequence of the on-going commodity approach that dictates to ITGC to only consider durum wheat as a crop or a plant, the problem is still there and remains to be solved. Farmers who adopted the intensification model sought to maximise their profit at the detriment of their ecosystem, given that a huge amount of public subsidies supported the model. In their undertakings, they applied the technical recommendations with whatever they had at hand, even using the inappropriate tools for ploughing, for instance.

Durum wheat and rangelands clearance: Consequences of standardised state interventions[1]

Steppe rangelands are huge territories, collectively owned and managed for many centuries, whose main output is to feed livestock, mainly sheep. Agricultural policies regarding rangelands did not differentiate from a common agricultural land, although indigenous social settings still try to protect them from being reconverted into agricultural land. Since the independence, rangelands underwent a series of state interventions and policies which yielded the transformation of a transhumant society into a sedentarised agro-pastoral one. Stepwise, rangelands underwent a process of transformation into agricultural land in order to produce barley. It was the greatest consequence of the anti-drought policies executed by the state since the mid-1970s.

Anti-drought campaigns were designed with explicit objectives to help pastoralists to cope with repeated severe droughts but the way they were designed and implemented created major, far-reaching problems for the ecosystem. They concerned the distribution of subsidised imported barley and feed concentrates as well as the free anti-helminth vaccination of the flocks. However, after the 1986 oil-crash, the government was not able to maintain its anti-drought interventions and rangelands started to be converted into agricultural land to produce barley. In the late 1980s, the state decided to progressively reduce and later stop its support of the anti-drought campaigns because of scarcity of public resources. Feed imports dropped drastically and prices were liberalised. Pastoralists found themselves in an emergency to devise solutions to meet their feed needs. Most of them worked to clear the marginal lands in the steppe areas in order to cultivate barley for their animals. The crop gave both cheap grains and straw which could be used as supplementary feed to the rangelands output. Since then, we have started hearing about the phenomenon of “barley encroachment”. Pastoralists ploughed the marginal lands and the “cover-crop” dilemma became well-known. This dilemma derived its name from a tillage tool pastoralists had to resort to in order to plough their plots, altering the structure of the already-problematic shallow soil in these areas and accelerated wind- and water-led erosion. Year after year, barley acreage increased steadily to reach a frightening level.

Later, the application of the Structural Adjustment Programme in 1994, under IMF and World Bank “medication”, made things worse for these areas. As public subsidies were removed from wheat and the prices were liberalised, a great shift in the marginal from barley cultivation to wheat production was reported. Almost all pastoralists, especially the small and poorest ones, decided either to convert partially their barley plots into durum wheat or clear more range to grow durum wheat. Many officials and planners at the Ministry of Agriculture, instead of caring about the smooth process of degradation that was dramatically advancing in these areas, believed that the shift from barley to wheat was motivated by the farm-gate price of wheat fixed by the Ministry of Agriculture at almost 2 times the average price of barley on the free market. For them, farmers’ response to the new wheat price policy was satisfactory as, in their opinion, farmers found the wheat prices more attractive. In fact, this was partially true. Having had some discussions and informal group interviews with farmers in these areas, we understood that semolina price was the other factor underpinning this shift. Since its liberalisation, semolina price, as a consequence of state removal of subsidies from wheat price, became too expensive, and pastoralists decided to “grow” their own semolina, slightly to the detriment of their animals’ feed. Although perceived as economically better, producing durum wheat within these fragile ecosystems substantiated a distorted behaviour with far-reaching consequences, but given the fact that the household needs began to intensively compete with the livestock needs, pastors had to readapt their scale of priorities. This not only puts a great responsibility on the pastoralists’ shoulders of having to solve this feed-or-food equation but announces more degradation for the rangelands as farmers will have to clear more range to satisfy both needs. Table 1 corroborates this statement.

[1] This section owes much to Malki (1999).

Table 1. Evolvement of durum wheat acreage index during the 1990-1996 period
(source: Ministry of Agriculture & Fisheries, Serie B statistical bulletins 1990-1996)

Distribution	Index	1990	1991	1992	1993	1994	1995	1996
Pastoral zones	1990 = 100	100	161	179	110	22	121	299
	1994 = 100					100	545	1346
Agro-pastoral zones	1990 = 100	100	142	162	115	66	145	178
	1994 = 100					100	219	268
National total	1990 = 100	100	138	154	112	79	135	183
	1994 = 100					100	172	232

Conclusion: Durum wheat yield stability cannot be achieved through standardised policies

Planners and policy-makers in their search of improving durum wheat production in Algeria adopted interventions that were conceived and implemented upon a standardised manner on the whole country. Lacking an adequate *a priori* knowledge about the different responses that could be anticipated from different agro-ecological zones, these policies, instead of achieving sustainable results, yielded negative impacts, as mentioned earlier, which can hinder durum wheat production in Algeria in the long run.

This is to say that an appropriate policy of durum wheat improvement seeking sustainable results must be not only based on a sustainable use and management of natural resources but on taking the basic needs of the poor farmers into consideration, as well . Such an achievement cannot be obtained unless the diversity of ecosystems is acknowledged, and thus their intrinsic comparative advantages well documented. Standardisation, although it can help planners over-simplify reality, cannot disguise a diversified reality into a homogeneous one.

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