Around The Drying Practice and Developmental Improvement Proposal in Algerian Northern Sahara: Case of the Saharan Regions

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Abstract.

The present study aims to define the various facets that govern the drying practices of crop production in the Saharan regions. All the national producers have maintained the principle of a drying system based on ancestral know-how. Our field investigations have shown a lack of mastery of this knowledge in most producers. This finding, updated in this work, hinders a relative abundance of dried productions. Indeed, this lack of knowledge, questions on how is practiced the drying on the scale of the exploitations. The results obtained made it possible to better understand the origin of the anomalies. A lack of mastery of drying practices seems to be responsible for the current situation. We propose to maintain the industrial drying model developed, while focusing on improving the existing one.

Keywords: Algeria, Drying, Drying process, Food products, Saharan regions.
1. Introduction

Like vegetables, fruits are an important source of carbohydrates, vitamins, dietary fiber, water and antioxidants (Vanhauwaert E, 2012.; Algemene G, 2013.). It is therefore recommended to consume 250 g of fruit daily (about two fruits), even if the composition and nutrient content varies according to the type of fruit (Ost C, 2016). It is necessary not only to increase production, but also to examine all the possibilities of developing and using conservation methods compatible with the socio-economic and climatic conditions of these regions (Derby G, 1984). It is becoming clear that the preservation of food is no less important than their production (Spurgeon D, 1977). The quality of food products and the cost of their manufacture are the most important factors to consider when choosing a food preservation method (Lenart A, 2007). One of the major obstacles that these countries face in achieving food self-sufficiency is the lack of adequate means of conservation of their agricultural production, which is exposed to rapid deterioration due to unfavorable climatic conditions and many other endogenous hazards exogenous (Barr T.N, 1981). To deal with this problem, drying is a conservation technique accessible to all (Kapseu C, 2002). Solar drying is more suitable for food products because of their high temperature sensitivities and the moderate temperatures involved, in addition to economic and environmental reasons. We note, however, that over the last twenty years, considerable progress has been made in conservation processes in some of our countries, thanks to a wealth of knowledge and modern processing techniques such as drying more used today by many farmers or artisans. It represents a tradition inherited from one generation to another (Bahlouli et al., 2008). At the local level, there are traditional preservation methods (salting, drying, fermentation) that deserve to be promoted and developed. In developing countries, lack of appropriate technology, inadequate cultivation and fertilization, lack of marketing channels, inadequate transport, high post-harvest losses, etc., lead to a loss of food of 10% to 40% (Shyam et al., 2015). Water, being one of the main components of food, has a decisive direct influence on the quality and durability of food by its effect on many physicochemical and biological changes. The removal of water or the production of water difficult to access for the development of microbes is the main task while preserving the food (Lenart A, 2007). Unfortunately, many post-harvest losses are still lamented in the areas where these products are produced or marketed (Edoun et al., 2011). Another most appropriate and practical solution may be the reduction of food losses due to different reasons. (Lenart A, 2007). It is therefore time to think about adopting solutions limiting the damage caused by these losses. To valorize this important foodstuff on the local market or abroad, it is essential to foresee the best methods to preserve it for the longest possible duration.

What motivates this study is the delicate state in which our production units are located in terms of organization and practice of drying. In order to assess the implementation of the drying practice in the Ghardaia region, a field survey on 04 potential communes, based on findings and a literature search, was conducted across the study area. Faced with a growing
market, it is therefore essential to strengthen the production and processing potential of agricultural products. Indeed, by its very concept, which aims in particular to bring production closer to consumption, the drying of fruits and vegetables can contribute to the consolidation and development of the local economy through the valorization of agricultural and agri-food production. How can the drying practices of the local population in the study area be evaluated? How to lift the constraints?

The process of drying fruits and vegetables can contribute to the consolidation and development of the local agricultural economy through the establishment of a family food processing unit. To do this, it is necessary to evaluate the ways and means of drying practices used by the local population at the level of the study area, and to propose an improvement of the process aimed at removing the constraints constituting a brake on development of this sector.

2. Material and Methods

2.1 Brief sketch of the study area

The region concerned is a vast desert area north of the Sahara and whose boundaries correspond approximately to those of the wilaya of Ghardaia (administrative district). Its land area is about 86,560 km² and has an estimated 413,000 people (MICL, 2012) population.

It includes, in the northern part of the country of M’Zab, a rocky area, torn by a series of wadis (rivers exceptional flow) highly branched. We find an oasis or more on each of the main wadis of this region, including the valley of the M’Zab, which includes in itself a group of five oases. In its southern part, the region includes El Goléa area (Figure 1).

Although the date palm cultivation is dominant, agriculture Ghardaia is relatively diversified. There are growing vegetables, fruit trees, cereals (barley and durum wheat), in addition to the peanut crop. The existing livestock consists primarily of sheep; goat and camel, but there are also farms dairy cattle and broiler.

The oasis society evolved and seeks to adapt to the new economic situation (Conforti F et Tonneau JP, 1999). Positive evolutionary tendencies, which can be further consolidated, provided that the conditions for effective technical, financial and organizational supervision are also identified and identified (Bensaha H, et Arbouche F, 2016). It covers 8,656,000 hectares of which the study area represents 22% (1,870,500 hectares). Agriculture occupies 527,165 hectares (28%), divided between 517,165 hectares of rangelands (98%) and 10,000 hectares of crops. Farms under 2 hectares dominate with 68% and only 1% is around 10 hectares. Despite
an opinion shared on the interest of the analysis of production systems, work in this area remains insufficient, often incomplete or even non-existent in a large majority of Saharan regions. For the Algerian oases and specifically those of M'zab, despite some attempts, the scientific production on this theme is lacking. This region knows, like the other Saharan regions, socio-economic changes, in a changing national and international context.

Faced with changes in the economic context, farmers react according to the starting situation of the farm, other activities (extra-agricultural), their family choice, and especially their financial capacity (Conforti F et Tonneau JP, 1999). One of the major constraints is the insufficiency, if not the absence, of the operations required for the management of oasis crops and farms in the face of competition from other sectors that better pay the labor force while offering less arduous jobs (Benziouche S, et Chehat F, 2010). Based on these considerations, our objective is to identify ancestral drying practices and development prospects in the area comprising four communes among the thirteen of the M'zab region (Figure 1), one of the fourteen natural regions of the Algerian Sahara. (PDGDRS, 1998).

2.2 Survey and data analysis
The main drying food consumer for the household was asked to fill out the questionnaire. The questionnaire was subdivided in five sections: consumer profile, consumption habits, knowledge of certification, nature and type of dried products, and a general question. Along with the usual questions specific and helpful to the drying products’ market. The majority of the questions, developed from the existing literature, asked consumers about their drying food behavior and their opinions regarding foods which are produced locally. Questions about household and drying-food consumer characteristics were included in order to determine whether these characteristics are influenced attitudes towards locally grown drying products. Respondents were asked about their frequency of purchasing drying-food and looking at country-of-origin labels, to find their behavior. The back of the survey encouraged consumers to write any comments they might have and provided space for this purpose. Consumers of the studied region shop locally or in the major a neighboring city. Data were collected between January and February, 2008, totaling 30 collection days. Answers were analyzed by origin-Pro program. 1500 surveys were having been realized to a random sample of Households in a thirteen-municipality surrounding Ghardaia. The number of questionnaires returned from each municipality corresponded to these population percentages, providing a representative sample of the distribution of population across the thirteen municipalities. The return rate of the survey questionnaire was 52% for a total of 1300 responses.
3. Results and discussions

3.1 Profile of the consumers surveyed

As a reminder, in a normal and healthy Algerian individual food intake is 3 plus a snack in the afternoon (taste around 16 h). Obviously this quantity is different depending on the daily activity. It can not be the same in an office worker and a forced laborer. The daily frequency of food intake is also very important for the maintenance of good health.

Breakfast is most often a cup of black coffee or milk, a cup of hot chocolate or tea with some cereals, usually bread and jam with little or no butter or a brioche or croissant or chocolate bread.
Lunch It should be light and consist of a starter based on fresh raw vegetables, a dish (meat or grilled fish with vegetables, pasta or rice) and possibly a dessert preferably a fruit or a yoghurt rather than a pastry.

Dinner should be satisfied with a vegetable soup, a yoghurt and a fruit (DPH, 2018).

The purpose of this study is to develop a stronger understanding of inner of Saharan area consumers by examining their hedonic for food drying. Afin de comprendre la diversité des facteurs qui influencent le comportement des consommateurs et déterminent la composition de leurs marchés.

Identification of the consumer is of extreme importance, because the studied variables could be considered as indicator of how consumers are conducting their product. From the offspring, through the succession whether insured or not, passing through the origin of the activity of the consumer, his level of education enabling him to integrate new techniques, via innovation, towards the working capacity required in the drying. I a professional association frame the task would be needed for taking care of all the issues, before or after, including the production/drying process. It is the organization of various links (Production, Drying and Marketing), actions and measures to improve productivity, quality and reducing production costs. Such elements are of a significant value to improve an appropriate system, in the occurrence of the drying product. Allowing, through the same aspect, to make profit and ensure its reproduction.
From the figure 2, we notice that (25%) of consumers were young with age did not exceed 40 years. It continued to grow among adults (40-60 years) with (58%) of consumers. The last category (over 60) is denoted with (17%). According to the survey, it appeared that the majority of consumers were adults more than old and young. This could be explained by the foundation of home in this region by this age group.

In addition, we found that the study area was characterized essentially by a consumer where family members intervene directly or indirectly in the production/drying process, which suggested that succession is ensured by the transforming of the activity of drying from parents to their descendants or future consumers (head of household). Some consumers are people engaged in the field of drying for investment purpose of their financial capital or the exploited of his house. The transitional regime is a characteristic of Saharan agriculture and varies inversely with the age of head of household (DSA, 2018).

Survey results show that the educational level of consumers in the region is medium (Primary 34%) Fig 3. Most consumers have neutral attitudes toward dried foods. As a result, we understand that it is almost impossible for these people to keep even a rudimentary reading of
their food products. Their low level of education is a handicap for the adoption of processes newly introduced in the region and requiring technical expertise such as drying. Survey showed that large percentages of consumers are unaware of GMOs or do not fully understand GM products, their traits, and their effects. Notwithstanding, quality was the main factor determining purchase decision-making of consumers (Villalobos et al., 2010).

Tab 1. Recommendations regarding fruit consumption

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Recommended fruit quantities (day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 – 5 years</td>
<td>100-200 g (1 to 2 fruits)</td>
</tr>
<tr>
<td>6 - 11 years</td>
<td>250 g (2 fruits)</td>
</tr>
<tr>
<td>12 -18 years</td>
<td>375 g (3 fruits)</td>
</tr>
<tr>
<td>Adults (19 – 59 years)</td>
<td>250 g (2 fruits)</td>
</tr>
<tr>
<td>60 years and +</td>
<td>250-375 g (2 to 3 fruits)</td>
</tr>
</tbody>
</table>

Source: Pyramide alimentaire, Lebacq T & Ost C, 2016

In terms of the attitude of consumers at secondary and university level are characterized by a good control of food standards (hygienic conditions, labeling, and nature of products). Román et al (2017) note Consumers’ perceptions of naturalness are important for the acceptance of foods and food technologies. Thus, several studies have examined the significance of naturalness among consumers. The study shows consumers more concerned about and apprehensive of purchasing newly developed foods. Ost C (2016) noted that fruit consumption is positively associated with education level. For example, those with long-type and short-type tertiary education eat significantly more fruit (129 g / day and 122 g / day respectively) than those with lower levels of education (87 g / day). Study revealed that the consumption of dried products is more frequent among people with a relatively high level of education. Thus, those with a higher education are significantly more numerous (63% and 71%) than those with a higher level of education and of lower level of education (37%).
Survey revealed 17% of consumers rely on empirical knowledge with a very little scientific knowledge. This situation is incompatible with a good attitude of consumption, because the low-level consumer is often unable to prevent situations that may affect the quality of his food.

Consumers need to have a better understanding of the nature of food products, drying processes and storage conditions. Shahla Wunderlich and Kelsey A Gatto (2015) confirmed that consumer knowledge about GMOs has not increased at the same rate as the adoption of GMO crops. Research, training and extension (general and specific outreach) can not benefit from significantly increased resources, will have to integrate better and develop significant synergies.

Most consumers are not trained to respond to the difficulties they may encounter. It is explained by the lack of institutional mechanisms to inform the public about traceability.

3.2 Nature and type of dried products

The quality of foodstuffs and the cost of their manufacturing are the most important factors to be considered when choosing a food preservation method (Lenart A, 2007). Consumers of Saharan region are generally interested in knowing about the food they consume, including its source and, if processed, the ingredients that may have been added to it. Thus, from several interesting points of view, this sector appears to contribute to the diversification of urban food, and to regulate supply, while promoting local production adapted to the evolution of agrarian systems (Tab.1). Consumers are becoming increasingly demanding and they can have access to more information, and believe quality is not a mere marketing tool, but a philosophy as well (Barcellos et al., 2004). A balanced diet provides an adequate amount of calories and helps maintain the energy balance; it is both rich in micronutrients and dietary fiber. Many epidemiological studies associate such a diet with better health (Darmon et al, 2008). In the Saharan regions, the drying of agricultural products represents a very important socio-economic activity. They are renowned for the diversity of its agricultural production and its
wealth of culinary and medicinal plants (Tab.1). These cultures, among many others, constitute the keystone of the oasis agro-ecosystem because they allow the subsistence, the maintenance of the life and the sedentarisation of the populations. Therefore, it should not be surprising that most people, in recent decades, have a strong preference for natural foods (Rozin, Fischler, & Shields-Argeles, 2012). It is becoming clear that the preservation of food is no less important than their production (Spurgeon D, 1977). It is necessary not only to increase production, but also to examine all the possibilities of developing and using conservation methods compatible with the socio-economic situation and climatic conditions of these regions (Derby G, 1984). At the local level, there are traditional preservation methods (salting, drying, fermentation) that deserve to be promoted and developed.

Table 2. Main dried products in the study area

<table>
<thead>
<tr>
<th>Dried products</th>
<th>Fruits</th>
<th>Vegetables</th>
<th>Medicinal plants</th>
<th>Meat</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Figs</td>
<td>Hot pepper</td>
<td>Mint</td>
<td>Goat</td>
<td>Soured milk</td>
</tr>
<tr>
<td></td>
<td>39%</td>
<td>47%</td>
<td>42%</td>
<td>60%</td>
<td>53%</td>
</tr>
<tr>
<td>Apricot</td>
<td>28%</td>
<td>Tomato</td>
<td>Artemisia</td>
<td>20%</td>
<td>Sheep</td>
</tr>
<tr>
<td></td>
<td>27%</td>
<td>33%</td>
<td></td>
<td>33%</td>
<td>Lawsonia inermis</td>
</tr>
<tr>
<td>Dates</td>
<td>21%</td>
<td>Eggplant</td>
<td>Bay leaf</td>
<td>18%</td>
<td>Rabbit</td>
</tr>
<tr>
<td></td>
<td>19%</td>
<td></td>
<td></td>
<td>3%</td>
<td>pomegranate bark</td>
</tr>
<tr>
<td>Grapes</td>
<td>12%</td>
<td>Garlic</td>
<td>Rosemary</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anacyclus valentinus</td>
<td>2%</td>
<td></td>
</tr>
</tbody>
</table>

Source: 2018 survey

As part of the investigation, various industrial drying methods are used throughout the world such as kiln drying. In the Saharan regions, traditional drying or sun-drying is carried out in the open air for 20 days, the fruit dehydrates, but the quality is very poor compared to industrial drying. The study showed in particular that, despite the presence of similar products in the markets, the success of this product is not guaranteed. Indeed, some varieties are preserved but most often post harvest losses are important. To deal with this problem, drying is a conservation technique accessible to all (Kapseu C, 2002). Finally, the transportation of dried vegetables is cheaper than that of larger fresh vegetables.

In accordance with the objectives of the Ministry of Agriculture (MADR, 2018) to promote food products in stable dried products that can find new markets in the national and international
markets. Also, it is well known that modern drying processes preserve the nutritional value and organoleptic qualities of vegetables and dried fruits that can be used after rehydration (Gilbert et al., 1988). The multiple-choice questions in the questionnaire used for our surveys revealed the various problems encountered on a daily basis in the drying units.

The results of the survey reveal that solar drying is traditionally done on the roof of houses in the open air for 20 days; it allows dehydrating products fruits. These drying conditions do not allow the marketing of this product and limit the quality of the product. The vector of traditional drying is air, a simple drying of agricultural products with high water content, whole or fragmented, quickly shows its limits: long drying time of several days, biochemical degradation of products, development of pathogenic microorganisms favored, etc (Edoun et al., 2010). At the local level, dried agri-food products such as tomatoes, peppers, figs, apricots, date, red meat and rotten milk are widespread products and their success with oasis populations is well established. Some families provide drying and production of juice or jam from fruits (fig, olive table, apricot, etc.) and vegetables (tomato, pepper, etc.). The milk is also either packaged or processed into whey (soured milk). The products are generally intended for self-consumption. Some products undergo packaging operations that are practiced in traditional inherited ways such as mainly fruit drying, aromatic plants and medicinal, vegetable are marketed, storage in cool, etc (Tab.2).

The Saharan regions are known by the common dates dried (Khalt) or soft (Routab) which are dates intended for local consumption or partially and occasionally for export. These dates, although some of them are very popular, are hardly marketed as fresh or stored in the form of legs. The dates are packaged in variable forms, "natural" or after having undergone some transformations (humidification or drying, coating, coring) and in various packages: trays of 200 to 500 g, in twigs (1 to 3 kg carton packs) or in bulk "(Bachta et al., 2006). It is obvious that raw materials intended for drying are always subject to preliminary preparation (cleaning, sorting, sizing, bleaching / fumigation, etc.) for subsequent processing. Solar drying of figs is most
common in the study area. In traditional drying, figs are spread under the sun, on the ground, on a mat or on a tarpaulin exposing the products to dust, flies and soils and numerous and varied contaminations. As a result, the quality of the product is very poor hygienically and nutritionally. This method is therefore not recommended for economic reasons and especially for public health.

Our studies showed that stores are also trying to get closer to their customers by refreshing their usual daily supply with a range of products needed to prepare traditional food. Almost all 85 wholesalers in our study area sell dried products, much of which is exported to neighboring regions or even the Sahelian countries, even though this product does not appear in the customs documents, nor the certification process that guarantees the food safety of consumers. According to Van Rijswijk et al. (2008), certification provides differentiation, as it allows tracing and tracking a food product and its ingredients throughout the production chain.

We note that over the last twenty years, considerable progress has been made in conservation processes in some of our regions, thanks to a wealth of acquired knowledge and modern processing techniques such as drying, more and more used today by many farmers or artisans. Finally, the processing of products, especially fruits and vegetables, is not developed in the Saharan region given the absence of the developed industrial fabric. One of the research tendencies is to achieve the best possible quality of the final product (Lenart A, 2007). A better understanding of the process is also essential and necessarily involves scientific research.

3.3 Behavior and drying practices

Acceptability tests for dried products in the study area were conducted with households and stores of dried product. It reveals the main trends in consumer behavior at a given time and in a given population. The sample included just over 250 households and 85 stores located in the area. Acceptability tests first allowed us to verify that dried products are accepted by consumers (Figure 4). More than 50% of respondents found this product "Good", and 42%
found it "Acceptable". Overall, these products have become exotic habits, having been a deeply rooted practice in the culinary leadership of oasis society.

In our survey, among the 1500 consumers surveyed, almost 13% had never seen or heard of dried products; 41% had heard about it or had seen it before and 46% had already used it. As a result, 87% of the consumers surveyed do not follow the food pyramid recommendations in this regard. According to these local stores, the preparation of dried products is simplified and storage costs are much lower. So, care must be taken to improve storage conditions for surpluses when food production is important.

One of the major obstacles that these countries face in achieving food self-sufficiency is the lack of adequate means of conservation of their agricultural production, which is exposed to rapid deterioration due to unfavorable climatic conditions and many other endogenous hazards exogenous (Barr T.N, 1981). These agricultural products constitute the keystone of the oasis agro-ecosystem, because they allow the subsistence, the maintenance of the life and the fixing of the populations to the soil and the promotion of the woman by the employment and the preservation and the development of the ancestral know-how.
In recent decades, rapid population growth in the Saharan regions has led to the development of a real market for diversified and increasingly transformed local products (MADR, 2018). As with any new product, the launch on the market must be the subject of a consumer information campaign. It should be noted also that the popularization and awareness of the use of dried products in culinary habits by the media is very important. These are channels dedicated to food professionals and consumers who broadcast local recipe programs. It is noted that in comparison with the daily eating habits of the oasis, one of the most distinctive features of ceremonies is food. It represents a tradition inherited from one generation to the next.

The results of our study showed that oasis consumers have food needs that evolve towards more quality, safety and practicality. It is clear that the conditions of preservation by drying remain very archaic (François A, 1984); This has a negative impact on the organoleptic, sensory and nutritional qualities of agri-foodstuffs. Dried products are sold locally in raw form to intermediaries that move production to processing, packaging and marketing destinations nationwide. In the case of sales on feet, the intermediate collectors ensure themselves the harvest according to their suitability and needs. Thus, they seize the product sometimes well before maturity. This procedure increases the profit margin for intermediaries. In general, the practices of these operators are not well appreciated by farmers who describe them as clever practices against them.

The majority of consumers surveyed do not care about the certification process and the storage and packaging standards that guarantee food safety. According to Van Rijswijk et al., (2008), certification provides differentiation, as it allows tracing and tracking a food product and its ingredients throughout the production chain. Only 5% of the surveyed consumers said they required certification when purchasing their dried food.

Despite good nutritional qualities, its valorization, the local product has been slowed for a long time by the hardness of its artisanal transformation. It is boosted by the fast-growing
processing sector. A great diversity of processed products, whether traditional or industrial, exists and their development is accompanied by powerful technologies and policies. Although the potential of agro-food to contribute to economic and social development has been demonstrated, this sector still faces numerous constraints, both technical and related to the service environment necessary for its growth. So many challenges to take up to value local products. Finally, this lucrative sector is now penalized by a lack of recognition (informal sector, non-recognition of its trades) and support that could nevertheless generate a "virtuous circle" of modernization that can satisfy producers, processors and consumers alike.

3.4 Recommendations and prospects for development

In terms of economic value, the basket of Oasian housewives diversifies with a third of starchy foods, one third of animal products, and one third of "sauce products". The present article has opened interesting avenues for future research. We believe that longitudinal studies could provide additional insights on how consumption translated into actual behavior. Indeed, these consumer expectations pose huge challenges to the food industry. The government’s strategy aims to increase the productivity and profitability of drying units in agricultural value chains by targeting agribusiness sectors with high market growth potential (MADR, 2018).

Through this investigation, we confirmed that dried products offer new perspectives for rural populations. However, some constraints such as lack of production of know-how and post-harvest technologies, lack of economies of scale and lack of linkage with research and development remain and need to be addressed in future research programs -agricultural development. Since media sources are the main source of knowledge knowledge for many consumers, experts, such as scientific researchers, should consider moving into the spotlight to disseminate factual information.

In the light of ongoing research, the sector is now penalized by a lack of recognition (informal sector, non-recognition of its trades) and support that could yet generate a "virtuous circle" of
modernization that can satisfy the producers, transformers than consumers. The agri-food sector faces multiple challenges:

- Technical: improve quality, productivity (through improved equipment and processes) and product presentation;
- Relating to the organization and dialogue between actors: dialogue between industry professionals and with consumer associations;
- Connecting the on-demand offer: improving market knowledge, distribution channels and product marketing strategies;
- On improving the supply and access to appropriate financial and non-financial services: credit, training and advice, research, infrastructure, other services (quality control, equipment manufacturing, inputs for example).

In conclusion, the secrets of science are hidden between men; it is up to us to value them in order to use them for the development of humanity.

4. Conclusion
The results revealed important insights on how consumer translates into actual behavior. Several research gaps have been identified which open interesting research in the future. The construction of small plants for agri-food products drying can be a good way for increasing income of family farms, reduction of unemployment and overall development and economic empowerment of the Algerian rural. Initiate a serious subsidy programs for building mini dryer as well as support for export products in farms. They would significantly contribute to the development of this farms. Thereby, public power has to take necessary measures to popularize this technology to rural areas and also should give support in terms of skill development for the use this technology for production of safe and healthy foods and make its adoption a success. This helps in ensuring dual purpose of Saharan regions development through employment
generation in this regions and availability of foods throughout the year for consumption. Thus, the twin objectives of Saharan regions and national development and environment management can be achieved with conventional energy like solar energy.

5. References


