The Prickly Pear, a shrub of real contribution to the livelihoods of farmers in in eastern dray land of Algeria

A Pera Espinhosa, um arbusto de real contribuição para a subsistência dos agricultores nas terras dray orientais da Argélia

A Pera Espinhosa, um arbusto que contribui verdadeiramente para a subsistência dos agricultores das terras do leste da Argélia

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Mourad Douh
Doctorate in Animal and Agricultural Sciences by Univ: Chadli Ben Djedid of Taref, Algeria
Institution: Biotechnology Research (CRBt), Ali Mendjli Nouvelle Ville Constantine 25000, Algeria, Agronomy Depart, Faculty of Life and Natural Sciences, Chadli Ben Djedid University Taref
Address: Algeria
E-mail: mouraddouh@gmail.com

Larbi Karkour
Doctorate in Agricultural Sciences, Faculty of Natural and Life Sciences Sétif 1, Algeria
Institution: Biotechnology Research (CRBt). Ali Mendjli Nouvelle Ville Constantine 25000
Address: Algeria
E-mail: karkourlarbi@yahoo.fr

Samir Chekchaki
Doctorate in Agricultural Sciences by Univ: Badji Mokhtar Labo. biologie végétale Annaba
Institution: Biotechnology Research (CRBt). Ali Mendjli Nouvelle Ville Constantine 25000
Address: Algeria
E-mail: s.chekchaki@crbt.dz

Nouari Rebai
Doctorate in Animal and Agricultural Sciences from the University of Taref 36000 Algeria
Institution: Biotechnology Research (CRBt). Ali Mendjli Nouvelle Ville Constantine 25000
Address: Algeria

Rebiai Samia
Doctorate in Animal and Agricultural Sciences by University of Taref 36000
Institution: Faculty of Natural and Life Sciences University Cherif Messaadia Souk Ahras 41000
Address: Algeria
E-mail: s.rebei@univ-soukahras.dz

Faicel Chacha
Doctorate in Veterinary Sciences by University of Cherif Messaadia Souk Ahras
Institution: Biotechnology Research (CRBt). Ali Mendjli Nouvelle Ville Constantine 25000
Address: Algeria
E-mail: f.chacha@crbt.dz

Laid Bouchaala
Doctorate in Ecological Sciences by University of Tizi ouzou 15000
Institution: Environmental Research. Center Annaba BP 12, Annaba 23000
Address: Algeria
E-mail: mlaidb@yahoo.fr

ABSTRACT
The study aims to assess the economic benefits and poverty impact of prickly pear fruit sales, focusing on commercial practices and the socio-economic status of participants. Data was gathered from 60 individuals across 32 locations through face-to-face surveys conducted from June to September 2023. The analysis, covering 20% of the regional actors, revealed that most participants were relatively young, with higher primary education levels and low university education (8.33%). Women involved were mostly divorced, and the majority of sellers were private farm owners, with others being forwarders and traders. Unemployment drove their engagement in this activity. The average income from prickly pear sales is 89.10^3 DZD, with net earnings of 60,000.00 DZD per trader, which increases with hours worked. Approximately 60 traders generate a total seasonal income of around 42,000.00 DZD, significantly benefiting local economies. Prickly pear trading offers crucial support to households, particularly during tough economic times, showcases its importance despite modest returns. The prickly pear trade in the region plays a vital role in supporting local households economically, especially during periods of financial instability. The trade offers both a source of income and an opportunity for independence, despite challenges associated with harvesting and market dynamics. The study concludes that prickly pear sales provide a sustainable income source with potential for growth, suggesting broader use of these crops for food, fodder, and energy in Algeria.

Keywords: cactus, food, gross income, harvesting, livelihoods.

RESUMO
O estudo tem como objetivo avaliar os benefícios econômicos e o impacto na pobreza da venda de frutas de figo da Índia, com foco nas práticas comerciais e na situação socioeconômica dos participantes. Foram coletados dados de 60 indivíduos em 32 localidades por meio de pesquisas presenciais realizadas de junho a setembro de 2023. A análise, que abrangeu 20% dos atores regionais, revelou que a maioria dos participantes era relativamente jovem, com níveis mais altos de educação primária e baixa escolaridade

universitária (8,33%). As mulheres envolvidas eram, em sua maioria, divorciadas, e a maioria dos vendedores eram proprietários de fazendas particulares, e outros eram despachantes e comerciantes. O desemprego impulsionou seu envolvimento nessa atividade. A renda média das vendas de pera espinhosa é de 89,103 DZD, com ganhos líquidos de 60.000,00 DZD por comerciante, que aumentam com as horas trabalhadas. Aproximadamente 60 comerciantes geram uma renda sazonal total de cerca de 42.000,00 DZD, beneficiando significativamente as economias locais. O comércio de pera espinhosa oferece um apoio crucial às famílias, principalmente em tempos econômicos difíceis, demonstrando sua importância apesar dos retornos modestos. O comércio de pera espinhosa na região desempenha um papel vital no apoio econômico às famílias locais, especialmente durante períodos de instabilidade financeira. O comércio oferece uma fonte de renda e uma oportunidade de independência, apesar dos desafios associados à colheita e à dinâmica do mercado. O estudo conclui que as vendas de figo-da-índia proporcionam uma fonte de renda sustentável com potencial de crescimento, sugerindo um uso mais amplo dessas culturas como alimento, forragem e energia na Argélia.

Palavras-chave: cacto, alimento, renda bruta, colheita, meios de subsistência.

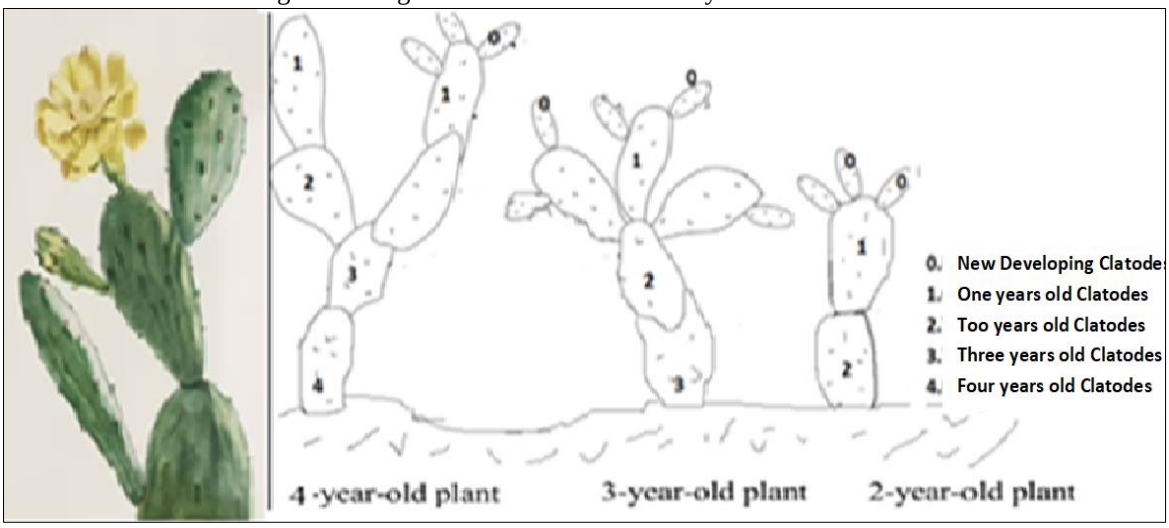
RESUMEN
El estudio pretende evaluar los beneficios económicos y el impacto en la pobreza de la venta de higos chumbos, centrándose en las prácticas comerciales y el estatus socioeconómico de los participantes. Se recopilaron datos de 60 individuos en 32 localidades mediante encuestas cara a cara realizadas entre junio y septiembre de 2023. El análisis, que abarcó al 20% de los agentes regionales, reveló que la mayoría de los participantes eran relativamente jóvenes, con niveles superiores de educación primaria y bajos de educación universitaria (8,33%). Las mujeres implicadas eran en su mayoría divorciadas, y la mayoría de las vendedoras eran propietarias de explotaciones agrícolas privadas, mientras que otras eran despachadoras y comerciantes. El desempleo impulsó su implicación en esta actividad. Los ingresos medios de la venta de higos chumbos ascienden a 89.103 DZD, con unos ingresos netos de 60.000 DZD por comerciante, que aumentan con las horas trabajadas. Aproximadamente 60 comerciantes generan unos ingresos estacionales totales de unos 42.000 DZD, lo que beneficia significativamente a las economías locales. El comercio de higos chumbos proporciona un apoyo crucial a las familias, especialmente en tiempos de dificultades económicas, lo que demuestra su importancia a pesar de los modestos ingresos. El comercio de higos chumbos en la región desempeña un papel vital en el apoyo económico a las familias locales, especialmente en periodos de inestabilidad financiera. El comercio ofrece una fuente de ingresos y una oportunidad de independencia, a pesar de los retos asociados a la cosecha y a la dinámica del mercado. El estudio concluye que la venta de higos chumbos proporciona una fuente sostenible de ingresos con potencial de crecimiento, lo que sugiere un uso más amplio de estos cultivos como alimento, forraje y energía en Argelia.

Palabras clave: cactus, alimentación, ingresos brutos, cosecha, medios de subsistencia.

1 INTRODUCTION

The Cactaceae encompasses several economically promising species mainly in the genus Pontiac. This genus seems to have its center of genetic diversity where it is often used as fodder, forage, fruit and green vegetable. *(Opuntia ficus-indica),* known as prickly pear, is the most economically important plant in the world (Adli *et al.,* 2016, Jameel Ali Alsaad *et al.,* 2019; Andreu-Coll *et al.,* 2019 Mahdeb *et al.,* 2021; Francisca Hernández *et al.,* 2020 and Kumar *et al.,* 2022). Which give it resilience to the impact of climate change and demographic pressures (*Opuntia ficus-indica*), has a large area of distribution according to their wide ability to withstand arid and semi-arid conditions (Azizi-Gannouni *et al.,* 2020). Biological occupations can alter the internal properties of the soil, leading to impacts on ecosystem services and functions and biodiversity (Moslehi Jouybari *et al.,* 2022). This is manifested by the decrease in vegetation cover and the decline of species of pastoral interest, which affects the productivity of pastoral systems and consequently worsens the poverty level of rural populations (Boussaada *et al.,* 2022). Drought is one of the main threats to food security in arid and semi-arid regions Sub-Saharan Africa (FAO, 2022; Sawadogo, 2023). Therefore, significant changes in agricultural production systems will be required to meet the challenges of food security while coping with water scarcity. Prickly pear is a drought tolerant plant, as well as a sustainable source of food and feed; very efficient because they can generate biomass under water stress conditions Figure (1). Due to its water conservation, prickly pear has been considered as a source of water for animals (Pastorelli *et al.,* 2022), also as a soil organic carbon (SOC) monitoring asset. The land use

Figure 1: Diagram different outlined life cycle of cladodes



Source: Prepared by the authors

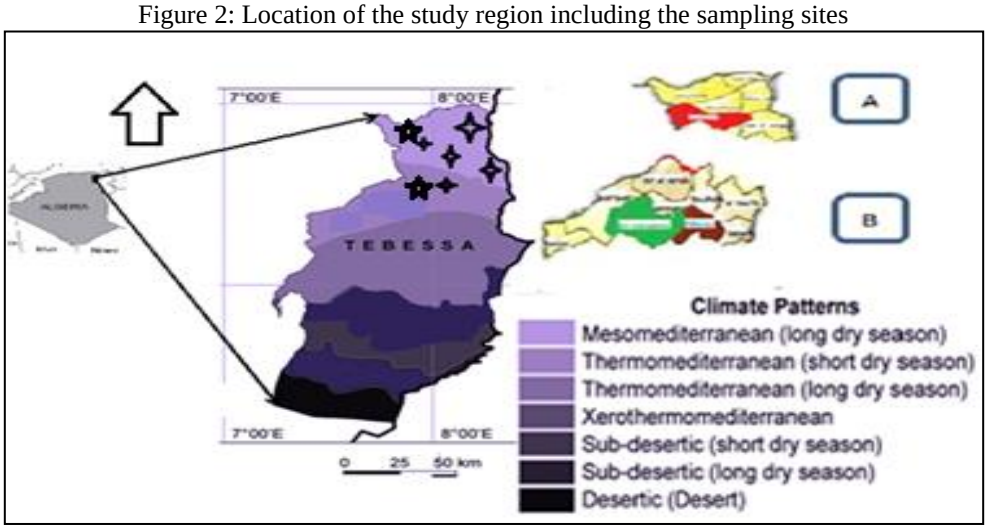
Conversion by the cactus cropping system, promotes the maintenance of soil organic carbon content, recalcitrant (abiotic and biotic degradation) carbon index and ecosystem aryl esterase activity. In addition, cactus systems promoted a greater amount of extractable organic matter in the soil, ensured by the carbon content, related to the increase in microbial biomass activity (Bautista-Cruz *et al.*, 2017). Nevertheless,under dry conditions, its growth and performance is limited (Lahbouki *et al.*, 2022). The mechanism for combating erosion and desertification is implemented through the use of biological (planting) and mechanical (protection structure) approaches. Among these approaches, natural resources, prickly pear *(Opuntia ficus-indica)*, a species that grows in arid climates. There are three production systems: wild associations, family orchards, and intensive commercial stands. Cactus have adapted to very poor soils exposed to intense erosion, used as a protector in times of dearth. The impact on livelihoods has been poorly documented, despite its widespread presence. Research has investigated the strong contribution of the prickly pear trade, as a vegetable and fodder species, to household satisfaction through an expansion of financial income flows to poor households. The objective is to measure the reflexive effects that the implementation of the positive effect on cash inputs and the impact on poverty, the socio-economic aspect of the actors involved, farmers, sellers, consumers and households, with emphasis on commercial transaction models and the highlighting of its economic interest.

2 MATERIALS AND METHODS

2.1 STUDY AREA

The study was conducted in the region of Tebessa (eastern Algeria). The Mediterranean climate (characterized by rainy and relatively cold winter and hot summer) typifies this region. The choice of the north–south direction for the transect is based on the use of the De Martonne climate index (aridity index). The field sampling was carried out in this region, on an axis of 80 km (see Figure 2). The climate is characterized by a very cold and rainy winter and a very hot summer.). The choice of north-south orientation for the transept is based on the use of the climate index, which reveals four types of Climates arid and semi-arid climates. Eight municipalities were selected bringing together 32 sampling sites see table 2 on an axis (35°.79'50.45N; 8°. 22'55.60 E). The average temperature was 23.80°C with a maximum in July (26.8°C) and a minimum in January (6.80°C). The average annual precipitation is of the order of 218.53 mm. The site presents an open area, characterized by a variable texture.

Figure 2: Location of the study region including the sampling sites



Source: Prepared by the authors

2.2 SAMPLING METHODS

The collection of data on the sale of prickly pear products was carried out by means of a face-to-face questionnaire of actors practicing this speculation between June and September 2023. Data on 60 actors interviewed 32 places said Table (1). The model

of sale the transport the charges, family situation. Based on observations during the research, it is estimated that the sample included about 20% of actors. The questionnaire, administered in the native Arabic dialect, was designed to gather comprehensive information on the socio-economic aspect, the history and characteristics of this speculation, organizational issues, harvesting and

Table 1: Distribution of sampling sites in the study area

Communes	Location	Sample
El Meridj	Doghra, Henchir lahdid, Ouled Waar et Zitoune	14
Morsott	Toricha, Oued Chabro, Toualbia et Toricha	11
Boukhadra	Gurniania, Ouled Naser, Debidiba et El Maalgua	9
Ain Zerga	Koudiet El Maalim, Azouza, Gastel et Ouled Nacer	6
El Hammamet	El Ennba, Dhraa lhmam, Mestiri et Youkous	7
El Kouif	Dabdoubi, Guerguerra, Kef Ougueb et Tebagua	5
Bekkaria	El Mouhed, Bourroman, Faidja et Talla	4
Tébessa	Boulhef, Kissa, Doukhane et Bordj Labaala	4
Total		60

Source: Prepared by the authors

selling habits, income from the trade, availability and access to the resource. The information gathered through interviews was used to focus on two sites Manifested by low and open structures. Despite the technical and material difficulties marked and imposed by the after-effects of the “COVID19” pandemic and the reluctance of stakeholders via these questionnaires; through the help of mediators we were able to carry out this work. The location of sales points in the study area were identified prior to data collection. Sixty actors (farmers, traders and intermediaries) were interviewed, 29 of whom were selling at local markets, 21 of whom were selling along axes and roads linking communes and chief towns, and 10 of whom were selling at the edge of towns. On the basis of the tests made during the research, we estimate a parent population (N=520), and that the sample taken of study (n) presents a rate of 11.53%. The questionnaire, offered to the profile of actors practicing this activity, aims to collect information via the history of prickly pear, the socio-economic and commercial component of these actors and their households, organizational constraints, harvesting and sales patterns, income from trade, availability and access to the resource. Information from the stakeholder profile interviews was used to locate and visit eight widely distributed potential harvest sites, 32 places location in Tebessa area; this information is summarized in Table (1) and Figure (2). At each site, the structure of size classes based on direct interview, for the purpose of highlighting overall deductions on the stock and sale.

3 RESULTS AND DISCUSSION

3.1 SOCIAL PROFILE OF TRADERS AND THEIR HOUSEHOLDS

The majority of sellers of cactus interviewed are farmers (66.66%) with their own cactus plantation (62.22%), followed by forwarders and traders (11.12% and 26.66%). The traders, both men and women, cited unemployment and lack of money as reasons for engaging in this business activity. The age ranges from 20 to 75 years, with an average of 45±14.58 years. The category of]35-50[years, presents the highest percentage with 41.67%, while the oldest category] 65-75[years, presents only 11.66% of the total actors surveyed. The primary intellectual level was occupied by 45%, the intermediate level 28.33%, 18.34% of the actors are illiterate and do not have any education presented in Table (2). The university level is very only presents 8.33%.The female gender was the lowest with a rate of 6.67%.These are generally divorced women and those with continuous absence of the husband due to his death, having heavy family responsibility. Female-headed households (female-occupied), in most cases, are in an unstable economic situation compared to male-headed households (male); the fact that a large proportion of commercial households belong to this vulnerable group suggests the importance of this profession. The fact that a large proportion of commercial households belong to this vulnerable group; the fact that they suggest the importance of this commercial practice . A full 63.3% of the actor traders were between 35 and 65 years old and

Table 2: Socio-economic typology of actors and their households restricted

Distribution of trader ages (years)	**Proportion Trader**	**(%)**
] 20–35 [	15	25,00
] 35–50 [	25	41,67
] 50–65 [	13	21,67
] 65–75 [	7	11,66
Membership in categories	**Proportion Trader**	(%)
Tree orchard farmers	34	56,67
tradespeople	17	28,33
Intermediaries	9	15,00
Position of trader in household	**Proportion Trader**	(%)
Head	32	53,33
Wife	4	06,67
Dependent single	15	25,00
Child	9	15,00
Highest education levels of trader	**Proportion Trader**	(%)
None	11	18,34
Primary school (Grades 5 to 10 years)	27	45,00
Secondary school (Grades 11to 16 years)	17	28,33

University (Grades 17 to 25 years)	5	08,33
Household composition	**Nbr of individuals**	(Mean ±SE)
Average household size	4,07±3,44	(±3,44)
Number of adults	2,24±2,21	(±2,21)
Number of children	1,82±1.69	01,69
Head of household	**Proportion Trader**	(%)
Married male	32	53,33
Single male	17	28,33
Divorced male	11	18,33
Total Actors	**60**	**100**

Source: Prepared by the authors

were in anacceptable life stage, where they were most likely to be able to support their families. The educational levels of the traders were often average, see in Table (2), with more than two-thirds (73.33%) having primary and intermediate levels of education, while 18% were distributed between 0 and university level with a low rate of only 8.30%. The social aspect and the family structure was presented by 53.33% of married actors, or 32 people; 17 single people (28.33%) (11 divorced people, equivalent of 18.33%).

3.2 FINANCIAL FUNCTION COLLECTED VIA THE BARBARY PEAR TRADE

Two-thirds of the traders had a permanent and regular income from the national pension fund, in one form or another (pension). About two-thirds of traders (41 individuals, equivalent of 68.34%) received at least one pension per month, with 31.66% receiving no financial support from the state. The importance of these pensions is underlined by the fact that all households receiving a pension indicated that it was their main source of income. This is typical of the social side of the citizens granted by the Algerian state. The actors responsible for the households did not have fixed jobs, 85% of them work under the informal aspect, that is to say the number of 16 persons, this finding indicates that unemployment was less recorded among the households of our sample before 69% having a stable income. As presented in

Table 3: Organization and financial contribution in household income class

Variable	**Values***	**Percent**
1-Sources of income within trader's household	Proportion traders	**(%)**
At least one job	19	31.67
At least one pension	15	25.00
Unemployed	11	18.33
At least one disability grant	7	11.67
No regular source of income	8	13.33
2-Household income class Proportion of traders	Proportion traders	(%)
40,000.00 DZD per Month	2	3.33
] 40,000.00 60,000.00 DZD [Per month	8	13.33

] 60,000.00 80,000.00 DZD [Per month	9	15.00
] 80,000.00 100,000.00 DZD [Per month	17	28.33
]100,000.00 120,000.00 DZD [Per month	19	31.67
+ 120000.00 DZD per month	7	11.67
3-Occupation to commencing prickly pear trade	Proportion traders	(%)
Unemployed	7	11.67
Formal job	11	18.33
Self-employed /trading	6	10.00
State emplument	21	35.00
State pensionner	15	25.00
4-Endowment of used road equipment	Proportion traders	(%)
Mini Truck	8	13.33
Tourist car	23	38.33
Car and van rental	11	18.33
Location	18	30.00

Source: Prepared by the authors

Table 3; the employment history of the actors before joining the prickly pear trade was quite variable: 11.67% were unemployed (7 actors); 18.33% were formally employed (11 actors); 10% were self-employed (6 actors), 35% were in state employment (21 actors) and 25% were retired (15 individuals). of these employed households, only 1/4 reported that employment was the most important source of income, indicating that available jobs often did not provide an adequate monthly income at an average of (35,000.00 to50,000.00) Algerian Dinar (DZD) or the equivalent of (225-320)€. A significant proportion of households received child allowances, with 35 actors (58.33%). It is obvious that these family allowances are granted to all employees or pensioners affiliated to the national pension fund. The practice of prickly pear trade is considered by 38 respondents (64%) as a complementary financial source, this is due to the fact that the duration of the harvest, of limited sale, which hardly exceeds two months; 45 of households. They informed that this sale activity is of absolute importance given the high degree of uncertainty regarding the coverage of family needs, whose expenses are high. Hence, the activity is considered a source of additional income.

3.3 INDIVIDUAL ECONOMIC PROFILE OF TRADERS AND THEIR HOUSEHOLDS

The average seasonal income (2 months of exercise) of the actor's traders of prickly pear (*Opuntia ficus-indica*) was 86,611.11±41,252.99DZD equivalent of (553.56±263.66)€ being situated approximately at the average of the state salaries to the worker of middle class of the order of 35,000 to 45,000 DZD. The average monthly income of merchant households (average size 4.07±3.44 individuals) is projected above

the minimum standard of living of 35,000 DZD for a household of 4.7 people justified by the Algerian GDP evaluated at 566633.81DZD /year or 47,219.48 DZD per month equivalent of 3,874, 60€/year, that is to say 45 of merchant actors (75%) earned between 60,000.00 to 100,000.00 DZD/month 17% of traders with low incomes earned less than 60,000.00DZD. On the other hand, the large intermediary actors whose revenues allocated via this speculation exceeded 120,000.00DZD per month are of the order of 7 people or (12%), see in Table (3). The main reason for entering this trade was unemployment and the increase in financial needs influenced by inflation and price increases via consumer goods passed on by the global crisis such as COVID 19, the war in Ukraine, the drought and civil wars across the African continent. The majority of them (80%) were unemployed at the time they joined this trade as a speculation. Fifteen of them (25%) had sold other products before, including prickly pears. Thirty-four of the respondents (58%) liked being independent, but would have preferred to sell products that were easier to collect and store than prickly pear, due to the seasonal nature and arduous conditions associated with collection. 11 of them (18%) stated that it was an option in bringing more money, because the purchase price on the feet was very reasonable.

3.4 SALE OF PRICKLY PEARS AND THE COMMERCIAL CIRCLE

The fruits (*Opuntia ficus-indica)*, were collected in many places said potential site (Ouenza Boukhadra and El Meridj (30-70) km from the city of Tebessa), other are stuck to the border of Opuntia orchards along the route Doghra, Henchir Lahdid, Ouled Waar (El Meridj); Toricha, Oued Chabro: (Morssott), Dhraa lhmam: (El Hammamet), Gurniania Ouled Naser (Boukhadra). About half of actor's traders (52%) or 31 actors harvest this fruit on their own orchards of prickly pear and on their personal farms 32% of actors (19) harvest these fruits on orchards of Opuntia in rent, against 16% often are classified as actors forwarding (10) of the farmer and village consumers residing in the capital of cities The district of El Meridj, Morsott and Boukhadra present the great mass of harvest is considered as potential sites, with 34 traders (57%) harvesting there. Other common areas were of minor importance Tebessa and Bekkaria, or the rate of representation assembled hardly exceeds 8 actors (14%). The speculators move on potential sites have the abundance of the product so the purchase price quite low ranging from 500.00 to 800.00 DZD/Case of 300 units of fruit, the equivalent of 3.5 to 4.2 € the

case or 2 DZD/Unit, with only five (14%) collected from them. Interestingly, traders residing in the city through the harvesting agents went to collect adjacent to the sites in El Kouif, Bekkaria and Ain Zerga on a radius of 30-39 km (2 to 3 hours travel time). Given the high proportion of actors harvesting on private land, it is not surprising that a high number of these practitioners in the prickly pear trade in number of 22 actors have abandoned this niche. The authorization of fruit harvesting is done on reserved periods, given the tribal sensitivity of the Algerian society. Almost all sales transactions are done in the informal without any invoice, except for the sale of snowshoes to the profile of state institutions such as the High Commission for the development of the steppe (HCDS). Access to plant reserves (fruit harvesting) was conditioned by criteria: sales price negotiations, the availability of harvesting agents and the structure of the orchards in plantation (Density, Distance and terrain: flat or uneven). The lack of fruit and the unaccommodating attitude of arborists through the sale of wholesale blocks were cited by sellers. 45 actors (75%) said that access was obtained on the condition that landlords receive money, while respecting tribal traditions).

3.5 MODEL AND SCHEME ADOPTED IN CACTUS FRUIT HARVESTING

The study elaborated to highlight that the large mass of actors surveyed were engaged in the collection and sale of the resource. Most of them 32 actors, which are (54%), were doing collective harvesting through family support, friends and neighbors as well as other sellers, whose purpose is to reduce financial burdens. The duration of harvesting is variable, frequently begins at dawn to avoid sunburn especially that this region known by high temperatures reaches 38°C), making either: the uprooting with hand menu of a protective plastic gloves of the fruits of prickly pear (*Opuntia ficus-indica*); or by the fall on the ground using a long wooden stick or light metal equipped with a metal hook upstream. The superficial cleaning operation carried out by the actors of the region concerning the tiny thorns was carried out by leafy Collection and sale mechanisms adopted by actors branches of Halfa *(Stipa tenacessima),* and placed in boxes of 300 to 400 units, of fruit weighing about 20-25 kg. The collection is very difficult, according to the opinions put forward by these actors, because of the presence of very sharp thorns quite painful, so the access on orchards seen the archaic plantations

Table 4: Collection and sale mechanisms adopted by actors

Referential site and deed of sale	Daily sales (Days)	Collection path back and forth (hours)	Daily collection frequency	Number harvested fruit unit
Roadside				
Collection on the day of the sale	2±0.47	1±0.60	6±0.70	1,500±175
Alternate picking 1 in 2 sale	1±0.35	4±0.40	2±0.60	2,200±220
At town level				
Picking during the day of sale	2±0.43	2±0.20	4±0.6	3,100±175
Alternate collection 1/ 2 sale	1±0.20	5±0.42	3±07	4,000±232
At central market				
Picking during the day of sale	2±0.43	2±0.21	2±0.5	6,000±120
Alternate picking 1 in 2 sale	3±0.43	6±0.30	1±0.9	10,000±350

Source: Prepared by the authors

and the limited distance between shrubs from (1, 1.5 m) of constituted an obstacle. Adding the danger of reptiles especially the venomous snakes such as the viperine snake (*Natrix maura*) and the snake has collar (*Natrix astreptophora*) between the shrubs of cactus presents a natural refuge of excellence. In number of fifty actors (84%) collected only green fruits. only ten actors (16%) are part of the development programs initiated by the High Commission for the development of steppe (HCDS) and the direction of agricultural services (DAS).The aim of the sale of prickly pears in order to ensure possible adequate planting and extension of spaces in the range .The actors stated that the quality of the fruits was periodic and depended on the rainy season. The frequency and duration of collection trips vary; influenced by the availability of means of transport, personnel as well as by metrological conditions and the proximity or not of the farmers' residence to the collection points. In this study, actors are divided into two groups: those who harvested on sale days and those who harvested every other day, information are summarized in Table (4). The difference is in the quota harvested and the place of sale; those in the first group that harvested every day collected early in the morning and then sold at sites close to their place of residence and at the side of the road, at cheaper prices. This price is induced by the fact of small harvests ranging from 1500 to 2500 units of cactus fruits, the equivalent of 3 to 8 boxes. On the other hand, those who harvested alternately 1 out of 2 (Actors of El Ouenza EL Meridj and Boukhadra (A). harvesting in the evening and selling their produce in the town market at high prices. the quantity harvested exceeds 8000 units of figs, the equivalent of 32 boxes. The sale is carried out through intermediaries and on distant markets, with wholesale prices of 1,000.00 to 1,200.00DZD /box (6.3 to 7.50 €). This variability in working hours was accentuated by the fact that certain actors were more reasonable than others, and whether the aspect of the sales operation was daily or weekly, this led to unlimited modification of the schedule

of work, presented in Table (4), affecting the schedule which recorded up to 8 hours of (6± 0.30 hours).

3.5.1 Seasonal act of prickly pear marketing

The sale of prickly pears, (*Opuntia ficus-indica*) manifests itself in different aspects. Those sold at home made by 03 actors door to door; 37 roadside actors and 20 actors in informal local markets. Sellers prefer to sell these products based on the concentration of local influences, the number of customers and the distance between the place of residence and the point of sale. Table (5) shows that the fruit is sold within an average lead time of 35 to 50 days (37.25±7.5 days) during the summer (mid-July-September). On the one hand, the gross income per season and per actor is estimated at 89,000.50±3,500.52DZD, (650€). At the same time, the costs per season (transport, meals and bags) per seller are approximately 8,500.20±1,025.10DZD. On the other hand, wholesale prices are set after discussion and consultation. For the retail product the price was fixed in advance, note that these prices vary from one seller to another. During the survey the selling price of a box of prickly pear containing 250 to 300 units is 1,000.00 to 1,200.00 DZD depending on the quality of the product displayed. The roadside sellers were vicious in their price display. Some offer a price around 800.00DZD, mainly caused by the low costs incurred during harvesting, particularly transport. On the markets in town, the costs were higher; prickly pears are often sold in plastic bags of 100 units. The average weight per fruit was 69.22±7.80gr. Addition of another marketing aspect, the sale in25 liter cans; where the average price per bucket was 600.0DZD.

Table 5: Average financial inputs of actors via the prickly pear trade

Variable	Values± Ecart type
Individual income	
Number of days spent selling per actors	37.25±7.50 Days
Gross income (DZD) per season per actors	89,000.50±3,500.52DZD
Costs (DZD) /Season (transport. lunch. bags)/ actors	8,500.20±1,025.10 DZD
Net cash income (DZD) per season per actors	65,000.12±5,800.30DZD
Labor per season and per trader	2.10±0.70 Workers
Labor mobilized for the fig collection operation	3.25 ±1.12 hours
Weekly collection and sale of prickly pears	6,524 ± 1419 Unit

Source: Prepared by the authors

The 20 actors are people responsible for elderly homes (35%). On the Kelatous, Oued K'sob, Morssot, Boukhadra, Doghra, Henchir Lahdid and Ouled Waar axis, we note

that these actors practice sales of other fruits in parallel such as: Wild cardoon, traditional chicken eggs and Leben (butter-milk obtained from spontaneously fermented raw milk). The 24 actors (40%) announce once the fig harvest is finished, they replace the fig tree with another speculative tree fruit sale such as the olive tree, apricot. 15 actors (25%), practicing the profession of seller only occasionally and exclusively.

3.5.2 Financial inputs from the cactus fruit trade by households

Table (3) shows, that the income from the seasonal sale of prickly pear (*Opuntia ficus-indica),* is very variable ranging from 40,000.00 to more than 120,000.00 Algerian dinars. The number of hours they were made available was a measure of this. Those who spent more hours trading earned more money (r^2= 0.27; P.0.05). The average players earned a net income of 60 000 to 80 000 DZD per season (450 to 560 €). The average gross income per trader was 89,000.50±3,500.52 DZD. The cost in (DZD) per season (transport. meals. bags and others) per actor is 8 500.20±1,025.10 DZD. It represented on average 9.55% of the total gross income. This trade has a contribution. It is significant because there was a negative correlation between the rate of contribution of trade and average annual household income. This finding is supported by several research studies that show that it is often the poorest groups of individuals that amass the highest financial wealth (Byron and Arnold. 1999). Although eighteen actors (unemployed and formally employed), or 30%, who did not have a regular income; stated that this was all they had, the rest (42 actors) stated that the income generated from trade was significant. About 62% of them, or 27 actors, used this income to buy food and means of subsistence. Households with a regular source of income said the money was useful when pensions arrived late. 1/4 of households paid their daily expenses through the sale of snowshoes. The sale of prickly pear as noted by Shackleton (2017) and Sipango *et al.,* 2022 in a study on livelihood financial inputs linked to the sale of prickly pear by-products, shows its importance in fragile periods. The exchanges take place instantly at the end of July-August and the beginning of September and coincide with the start of school entry (social entry period). Revenues, regardless of their size, alleviate this pressure on allocated cash flows, although these prickly pear revenues are modest and available only for a limited period. This activity allows a group of particularly vulnerable households to complete their income where this assistance is needed. The collection of prickly pear requires

potential and difficult physical efforts caused by the external aspect of cladodes full of thorns that are easily lodged in the body (tiring. hot and unpleasant)

3.5.3 Economic capacity of contributions via the cactus fruit trade

Can households benefiting from the sale of prickly pears offset the costs linked to positive environmental and economic impacts; although we are not sure of the precise number of actors in the Tebessa study area? We estimated the sample size at 60 people out of a total of around 1500, with an average income of 60,000.00 to 80,000.00 DZD/ Household. This represents approximately 4,200,000.00 DZD, equivalent of €29,005.18 for this agricultural sector speculation. Presenting an appreciable sum, in the case of listening to the costs associated with the prickly pear at the national level. These return cost figures will be exponential, and highlight the economic argument for this shrub. Adjusted and approved by the vulnerability and poverty within the society of the region, pushes the moral, social, economic and ecological reasons. Can we overlook the fact that a person gets extra money? However small it may be of these harvests purely of prickly pears.

4 CONCLUSION AND PERSPECTIVES

The contribution of the prickly pear to the livelihoods of households and commercial actors is important. It is variable and depends in most cases on the income needs and the level of effort provided, hence, low-income households. Income benefited the most largely because they had no other source of income. However, in most cases revenues from the prickly pear trade made a significant additional contribution to the annual income. The absolute monetary benefits were proportionately discrete. The importance of this speculation for the livelihoods of actors should not be underestimated: as it is clear that the income generated and allocated provides another guideline in a multiple lifestyle. A portfolio frequently containing government aid and subsidies to the social and agricultural sector; especially among the limited and marginal revenues from the prickly pear trade which remain limited in time and space; The contribution of livelihoods to the profile of rural households will alleviate the problem of lack of liquidity; due to the severe and difficult nature of the harvest. Algerian rural actors would only begin this activity if it was worthwhile from the point of view of future speculation.

While almost all stakeholders felt that access and availability of the resource was adequate. The study found that access and availability could become an issue in the future, as many of the preferred harvesting sites are under legal title.

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