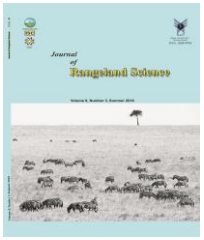
Contents available at ISC and SID

Journal homepage: www.rangeland.ir



Research and Full Length Article:

Economic Evaluation of Shallot Utilization in Varnasa Rangeland, Naghadeh, Iran

Javad Motamedi [A]*, Morteza Mofidi Chelan [B], Saeed Rahmanpour [C], Mahshid Souri [D]

[A]Associate Professor, Rangeland Research Division, Research Institute of Forests and Rangelands, Agricultural Research Education and Extension Organization (AREEO), Tehran, Iran *(Corresponding Author), Email: j.motamedi@rifr-ac.ir

[B]Ph. D. Graduated in Rangeland Sciences, Gorgan University of Agricultural Sciences and Natural Resources, Iran

[C]M.Sc. in Range Management, Natural Resources and Watershed Management Bureau of Naghdeh, Iran

[D]Assistant Professor, Rangeland Research Division, Research Institute of Forests and Rangelands, Agricultural Research Education and Extension Organization (AREEO), Tehran, Iran

Received on: 24/05/2017
Accepted on: 13/09/2017

Abstract. Recognition of byproducts and their exploiting economic evaluation is one of basic requirements in documenting prospect of rangelands utilization. In this regard, the present study was performed to estimate the economic indices of exploiting byproducts production in Varnasa rangelands, Naghadeh, Iran. For this purpose, the economic data for calculating economic indices were collected after sampling vegetation and estimating shallot species byproduct and forage production per unit area in 2015. The results showed that the annual economic benefit derived from forage production per household is 71.16 US$ y^{-1}. The generated economic rent was estimated about 98.14 US$ h^{-1} in year. Average gross income from the exploitation of byproducts in a harvest period per household was estimated around 838.23 US$ from 5.7 hectares that after reducing the explicit costs of utilization (transport), the net income was 761.61 US$ per household. Economic profit per household after reducing the hidden costs (labor) and explicit costs (transport) from gross income was estimated about 720.35 US$ $y^{-1}$and economic rent of exploiting shallot byproducts is 473.47 US$ h^{-1} per year. Considering the discount rate of 3%, the expected value per hectare of the studied rangelands for the byproducts and forge production are estimated about 789.12 and 32.71 US$, respectively. Similarly, the expected total value of rangelands for byproducts and forage production is amounting totally to 821.84 US$ that the share of shallot byproduct to total rangeland expected value is 96%. Incomes from the exploiting of byproducts and forage production comprise 27.2 and 1.3% out of the average annual income of households, respectively. In addition, annual employment of shallots byproduct and forage production utilization was estimated 1.44 and 0.16 person's y^{-1}, respectively which the share of byproduct is about 10% out of the total employment. The results show that the byproducts exploitation plays an important role in the local economy and employment as well as declining the increase of grazing intensity. Overall, the results of this study reveal the need to consider the byproduct incomes in range management schemes and comprehensive management of natural areas

.

Key words: Rangeland expected value, Net income, Economic rent, Economic profit, Byproducts of rangelands

Introduction

Rangeland ecosystems provide various services for human societies and should not be considered only in terms of forage and animal grazing; however, other aspects of their use should be taken into account as well (Akbarlou & Nodehi, 2016). For instance, it is greatly paid attention to the byproducts of plants such as roots, seeds, gums, mannans, fruits and leaves which are harvested by the exploiters and sold in the market every year (Shahraki *et al.,* 2015). Moreover, their utilization in the present economic conditions of the Iran is profitable (foreign trade) and can lead to suitable employment creation for the common exploiters on the condition that exploitation has to be based on the predicted policies and in the form of written exploitation programs regarding the production capacity of the studied area to a reasonable amount.

A few researches have been carried out for knowing byproducts and evaluating their exploitation in Iran. So far, the production ability of rangeland habitats in different climatic zones of Iran has not been determined in terms of byproducts. In addition, the allowable utilization rate of rangeland habitats for using byproducts has not been identified. As a result, the mentioned habitats are exploited less or more than enough. Moreover, the method of economic evaluation and assessment of the revenue from the byproducts in the exploitation plans is mainly descriptive rather than being on the basis of economics and proper evaluation methods of ecosystem functions (Motamedi *et al.,* 2017).

Such problems caused the executive organizations to suffer from the lack of a scientific guideline for utilizing plants. Therefore, identifying habitats, investigating the ecologic needs of the plants and specifying their production ability are some of the steps that are required to be taken in this regard and the results must be used to plan byproducts exploitation vision. Thus, it is always asked what the production potential of the rangeland habitats is in terms of byproducts, which areas are prone for utilization of byproduct sand and how much is the income of the utilization of byproducts in the rangeland habitats.

Accordingly, it is proposed that the amount of production and consumption should be taken into account and financial calculations of the byproducts must be made for the optimal management of the byproducts (Abdollahpour, 2004). Surveying the effect of economic and social issues related to the exploitation of byproducts in the northwest of Pacific Ocean manifested that the investigation of economic and social issues is beneficial for solving the problems of management, harvest, production, and selling these byproducts (Alexander *et al.,* 2002). It is also reported that byproducts play an important role in the economy of local people, conservation and developing the management of rangeland and forest ecosystems (Freed, 2003). However, the importance of byproducts on economy and livelihood of low-income families has been pointed out and it is reported that the legislative factors of improper organization of rangeland and forest areas as well as lack of information on how to use the products, and lack of marketing and impossibility of export are some of the main results of inattention to byproducts and their development (Aiyeloja & Ajewole, 2006).

As a confirmation of this issue, it is reported that byproducts play an important role in determining the livelihood of the exploiter families in the semi-arid areas of Africa and it is mentioned that the products comprise 39% of the poor families' income (Jense and Ottisch, 2005). The reports also reveal that secondary financial resources reduce families' dependence upon these areas. Furthermore, it is stated that the degree of local societies' consumptions

of byproducts varies depending on social situations and legal conditions of their harvest. Accordingly, the factors such as expenses for crop gathering (depending on the distance to the gathering site), investment return by collecting byproducts, secondary incomes, general economic condition of families, availability of work force and its cheapness are the elements expected to influence families' dependence on byproducts. In addition, the lack of stable management of forests and rangelands and the land use changes are only due to the lack of enough knowledge on the goods and the services that are provided by these areas locally, nationally and globally (Shylajan and Mythili, 2003).

Organizing the utilization of byproducts in the natural fields is essential and conducting ecologic studies related to each of the productive species clarifies their economic value. In Iran, a limited research has been carried out in evaluating the economic value of rangelands byproducts. For instance, the economic value of *Ferula assa-foetida* L. was investigated in Tabas, Iran and the income was calculated. The results showed that exploiting *Ferula assa-foetida* L. is a profitable economic activity which creates employment and is remarkably worth exporting (Khosravi and Mehrabi, 2005). The income from forage production and *Eremurus olgae* Regel (used for making glue) byproduct and its harvest economic indices such as the marketing margin, the expected value of the rangeland, economic rent and annual employment were investigated in the north of Western Azerbaijan (Maku), Iran. It is stated that the marketing margin of *Eremurus olgae* is equal to 60 percent due to its seasonal growth and high speed corruption. It also has the annual economic profit of 1457.44 US$ per family and the paid economic rent equals 25.50 US$[1] h^{-1} every year. Moreover, the expected value of harvesting the byproduct is 65.1 US$ and the expected value of the produced forage is 1020.20 US$ per hectare of the rangeland (Heshmatol Vaezin *et al.*, 2010).

Evaluating the shallot species (*Allium hirtifolium* Boiss) in this research, this species is one of the bulbous species which usually distributed in regularly slopes and hillsides of mountainous areas in terms of ecological conditions. The plant composition of such hillside areas is mostly grasses and perennial forbs. Its produced forage is less grazed by livestock directly, but when the vegetation has reached to its maximum growth in the early summer, the forages would be harvested and stored as winter fodder. In this respect, they are known as pastureland (where is cultivated and harvested) in the local custom and therefore, their forage is not counted in computing the grazing capacity in the growing season. In case of direct grazing, the current hillsides are assigned only to the lamb grazing. In addition, the habitats are also very valuable in terms of recreation and ecotourism (Motamedi *et al*., 2016). The important thing is that the shallot plant is usually brought out from the ground by custom rangeland owners in late May and also before grazing the sites in early summer. Finally, the underground tubers are used; therefore, reproduction and regeneration of underground tubers are prevented while the few remained plant bases are lost in the forage harvesting period in early summer. This is on condition that the tubers reach their maximum growth in early summer and is ready for utilization (Motamedi *et al*., 2016).

Given the expressed necessity in terms of knowing byproducts and their exploitation, the current study aimed to estimate some of the economic indices of utilizing shallot byproducts in Varnasay, Naghadeh rangelands so that the attention was paid to the value of rangelands from

[1] Regarding to the study year, each US$ was assumed about 29995 Rials

another viewpoint rather than forage production and their role was distinguished in employment and economy of utilizer households.

Materials and Methods

Study area

The present study was carried out in Varnasa, Naghadeh rangelands with area of 7500 hectares located in 36° 50' 17" to 36° 56' 33" northern latitudes and 45° 12' 22" to 45° 02' 42" eastern longitudes and is extended at an altitude range of 1500 to 2108 meters above the sea level (Fig. 1). The studied rangeland is one of the sub-basins of the Qarna Balqchy watershed in southeast of Western Azerbaijan which is located between the counties of Piranshahr, Naghadeh and Mahabad. According to the country political divisions, this area is in central part of Naghadeh County and it is located in the distance of 10 km from Naghadeh. The area has average annual rainfall and temperature of 540.5 mm and 12.2◦C, respectively. According to Demarton climagram method, the climate of the area is semi-arid cold (reports of executive- justification studies of Naghadeh Qarna watershed, 2008).

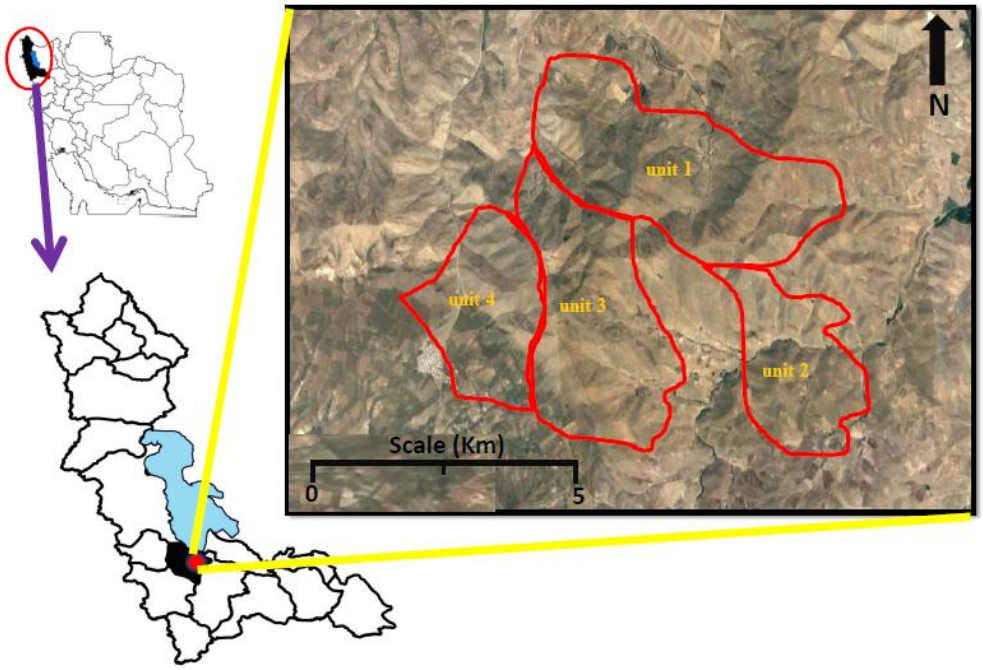


Fig. 1. Rangeland location and study units on the Google Earth images

For this study, four rangeland sites were selected as study units (habitats) where the shallot spices had considerable distribution as compared to other places. The physical properties of each study site are shown in Table 1. The land type of all the regions is Mountainous Regular hillside.

Table 1. Physical properties of study sites

Study unit	Geographical longitude and latitude	Distribution area (ha)	Elevation (m)	Dominant aspect	Dominant slope (%)	Soil texture
1	38S-525798E-4079686N	1.9	1650	North west	25	sillty loam
2	38S-525950E-4079521N	1.1	1653	North west	26	sillty loam
3	38S-525853E-4046399N	1.7	1658	North west	30	sillty loam
4	38S-525633E-4079472N	1.0	1665	North west	24	sillty loam

Introducing the species

Shallot (*Allium hirtifolium* Boiss) is a plant like garlic which has a large onion (tuber). Its leaves are narrow and long and the flower is reddish purple with a simple Raceme inflorescence (Fig. 2). About 40 species of this genus have been known; all of them grow in the temperate areas. Some species of shallots are planted as ornamental flowers in the gardens. The tuber of this plant is edible and used in pickling and food. It has fewer flavors than garlic. This plant has high nutritional value and its leaves as well as tuber are used in powdery form at food industries (Ebrahimi *et al*., 2008). It also has medicinal properties such as antibacterial (Rahbar *et al*., 2005), antimicrobial (Taran *et al*., 2006; Ghahremani-majd *et al*., 2012) and anti-tumor properties (Ghodrati Azadi *et al*., 2008). Medicinal, edible and industrial properties of this plant have caused to be utilized severity and wastefully. On the other hand, this species is highly endangered due to the destruction of rangelands, overgrazing and pest infestations.

Fig. 2. Shallot species in Varnasa, Naghadeh rangelands (50 cm high in May 2015)

Data collection

After selecting the study units, a representative area of 1-1.5 ha was selected and the vegetation was sampled. In this regard, vegetation structure, canopy cover percent, the number of species and shallot production were measured. Considering vegetation inventory, six plots of 1×10 m (a part of the Whittaker plot) were established within the representative stand and also within each of them, six plots of 60×25 cm were randomly used. So, in each of the study units, 60 plots (60×25 cm) were used which in terms of size and the adequacy of the sample size were consistent with the recommended statistical relationship for the rangelands and also were statistically assured a representative data of plant communities (Motamedi *et al*., 2016).

After the establishment of plots, canopy cover and number of species in each plot were recorded. Then, the entire shallot stems (bases) located in plots (60×25) within 1×10 m were taken out from the soil and after cleaning and washing, the underground tuber dry weight was measured. Because of this fact that the best time for harvesting the underground tubers is the early summer and the customary owners for the protection of sampling area did not cooperate, it is necessary that dry weight of underground tubers is multiplied by a constant coefficient to achieve the actual

weight of tubers at the best harvesting time. The constant coefficient was obtained about 0.3 by considering average weights of shallot glands in medicinal herb sellers (grocery). The dates of data collecting for shallots in locations of 1, 2, 3 and 4 were 05/01/2015, 05/02/94, 05/15/2015 and 05/16/2015, respectively. Upon the amount of shallot production in each unit, the cost of collecting and the revenues derived from the harvesting shallots were identified based on data from questionnaires and then, the expected value of shallot production per hectare of habitat was determined. In the end, the expected value of produced shallots was compared to the expected value of forage in habitats whereas in the time of visiting the area for measuring forage (which coincides with the end of June, and flowering dominant plants), places of investigation have been grazed by the exploiters; thus, the detailed information of the amount of forage did not been achieved. Therefore, the amount of available habitat forage was determined from the former reports of rangeland and vegetation analyses (Executive-feasibility studies of Qarna watershed Naghadeh, 2008).

Economic calculations

For economic analysis and the expected value calculation, the indices of marketing margin and economic rents were calculated and by dividing the economic rent on the discount rate, the actual value of the expected production of byproducts and forage per hectare of habitats was obtained. The relationships of calculating the index is presented.

Economic rent

The difference between the price of produced commodity (product) from a natural resource and also the spend costs for altering that natural resource to commodity is called Economic Rent (ER) (Saeed, 1995). The costs include the value of inputs of labor, capital, raw materials and energy, which are used to convert natural sources to the products.

In other words, the annual economic profit from the sale of one product per unit area is called Economic Rent (ER) (Saeed, 1995) that is calculated by reducing overt costs (logistics) and hidden ones (laboring) out of the gross income and dividing the result by the surface area. The following relations show how ER is calculated (Equations 1 & 2 & 3).

$$ER = \frac{TR - TC}{S} \qquad \text{(Equation 1)}$$

$$TR = Y \times P_Y \qquad \text{(Equation 2)}$$

$$TC = TVC \times TFC \qquad \text{(Equation 3)}$$

Where:
ER= economic rent
TR= total revenue
TC= total cost including overt and hidden costs
Y= total production
P_Y= the product price
TVC= total variable cost
TFC= total fixed cost
S= surface (ha)

Marketing margin coefficient

Marketing margin is one way of recognizing the commodity markets and the difference between consumer prices and farm price which represents the paying price of market agents for marketing services. The marketing margin includes purchasing, processing, packaging, transportation and warehousing (Daneshvar Ameri and Yazdani, 2007) (Equation 4).

$$r = \frac{p_r - p_w}{p_r} \times 100 \qquad \text{(Equation 4)}$$

Where:
r= marketing margin
p_r= retail price
p_w= price on the rangeland or wholesale price
The size of this coefficient depends on the type of service that is done to get the

product to the final consumer as well as the severity of corruption, speed of product sales and competition intensity in the market and overall market performance (Kupahi, 2008).

Annual Employment

In order to estimate area-wide employment, the number of individual-days, and the amount of work required for the product harvest in mind are divided by the number of useful working days per year (250 days) and as a result, the obtained employment is calculated for each individual in one year (Heshmatol vaezin *et al*., 2010). In the current research, the degree of employment was achieved by counting the number of the exploiter families and considering the average employment in each family (2 persons) and estimating the opportunity to exploit the byproduct by each family during the exploiting period using the following relation (Equation 5).

$$E = \frac{n \times d}{250} \quad \text{(Equation 5)}$$

Where:

E= employment

n= number of employed people each day

d= number of days when there was an employment opportunity during exploitation period

The expected value of the Shallot production in one hectare of habitats

The expected value of byproduct in each hectare was obtained by dividing the economic rent in real discount rate (Heshmatol vaezin *et al*., 2010) (Equation 6).

$$REV = \frac{ER}{r} \quad \text{(Equation 6)}$$

Where:

REV= Rangeland Expected Value per hectare in a year for by product

ER= Economic Rent

r= actual discount rate which is calculated by reducing risk and inflation rate out of current interest rate in an economic sector

The expected value of the forage production in the habitats

In order to estimate the expected value habitats of forage, after calculating the amount of usable production per hectare and comparing the average nutritional value of forage with barley, forage price is about 0.7 price of barley[2] in market of Iran (Eskandari *et al.*, 2008); the expected value of each site was estimated using the (Equation 6).

Total expected value of rangeland

The total value of the expected value of rangeland was calculated with summing the expected value of forage and shallot byproduct and the discount rate. In this way, the importance and the percentage of current byproduct utilization can be reached as compared to the total value rangeland to infinity.

Statistical analyses

Vegetation properties data in the study sites including the percentage of canopy cover of species and their number in each plot and shallots production were analyzed using one-way ANOVA and Duncan tests with SPSS software. Moreover, the economic calculations were done in Excel Software.

Results

Canopy cover percent and production in the sites

Analysis of variance for plant canopy cover percent is presented in Table 2. As it can be seen, the average percentage of canopy cover in the sites is significantly different. Higher canopy cover belongs to the first site and the lowest one is associated with the third site. In terms of average percentage of canopy cover, the four sites are classified in three groups.

[2] This coefficient was calculated regarding to comparison of average nutritive value of rangeland forage with barley.

Table 2. Analysis of variance for canopy cover in habitats

Study unit	Mean±Sd	ANOVA results				
1	63.09± 1.74 a	SOV	d.f	MS	F value	Sig
2	56.19± 1.68 b	Between sites	3	1561.4	11.05**	0.000
3	45.22± 3.19 c	Within sites	20	141.2	-	
4	49.30± 3.68 c	Total	23	-	-	

** Significance level in 1% probability level
The letters a,b,c in column show the significant difference of canopy cover in the sites

The mean and standard error of shallot production values are presented in Table 3. The results show a significant difference between the average productions of shallots in habitats ($P<0.05$). The greatest amount of shallot was measured in the first site with an average of 282.66 kgh^{-1}. The fourth site with a shallot production of 93.83 kgh^{-1} had the lowest production in the habitats. The allowable utilization factor of habitat was assumed about 60%. Thus, harvestable production was used in the economic calculations.

Table 3. Analysis of variance for shallot production in habitats

Study unit	Mean±Sd	ANOVA results				
1	282.66± 58.01 a	SOV	d.f	MS	F value	Sig
2	226.16± 78.07ab	Between sites	3	38798.05	2.260*	0.013
3	172.33± 37.01ab	Within sites	20	17164.31	-	
4	93.83± 24.70 b	Total	23	-	-	

** Significance level in 1% probability level
The letters a,b,c in column show the significant difference of canopy cover in the sites

Expected value for shallot and forage production in the sites

The values associated with the shallot production, net income, profit, economic rent and annual employment of shallot exploitation and forage productions as well as marketing margin coefficient of utilization in the sites are provided in Table 4. The amounts of available forage in the habitats was 84 to 126 kg/ha for the first place to the fourth one. In this regard, the allowable use factor has been considered for the sites about 60%. About five and two families are utilizing the shallot and forage production from the sites, respectively. In addition to these parameters, the expected value of shallot production and forage production in each site which have been calculated based on economic indices were also presented in this table. The results showed that the economic benefits derived from forage production is about 71.16 US$ per household per year and the resulting economic rent is about 98.14 US$ $h^{-1}y^{-1}$. Average gross income of shallots exploitation in a harvest period for each household was estimated about 838.23 US$ which after deducting the gross exploitation costs (freight), the net income per household in the period was amounted to 761.61 US$. Household economic profit after deducting hidden (labor) and clear (transport) costs out of gross income is 720.35 US$ and economic rent of shallot utilization was estimated about 473.47 US$ $h^{-1}y^{-1}$.

The expected values of shallot production and forage per hectare of rangeland area by taking a discount rate of 3% in 2015 were estimated 789.12 and 32.71 US$ h^{-1}, respectively. Similarly, the total expected value of the rangeland in terms of both shallot and forage production is about 821.84 US$. The share of shallot production to total expected value is about 96%. The income derived from the shallots and forage production make up about 27.2 and 1.3% of the annual income of beneficiary households. In addition, annual employment of forage production and utilization of shallots is about 0.96 and 1.27 person in year, respectively; shallot

production share is 57%. In this regard, annual household income of beneficiaries was considered as 2804.11 US$ per year. Also, during the forage production for livestock, grazing period was assumed to be three months. Annual employment of forage production and utilization of shallots were obtained about 1.44 and 0.16 people per year, respectively which the share of shallots was estimated about 10%.

Table 4. Expected value of shallots production and forage in the sites

Expected value of tuber production and forage	Sites				
	1	2	3	4	Sum
Area (hectare)	1.91	1.15	1.65	1.01	5.72
Shallot production (kg/ha)	188.11	150.51	114.69	62.45	515.76
Allowable forage (kg/ha)	126	126	84	84	420
Net income of shallot utilization (US$)	1743.61	839.98	918.36	305.94	3807.96
Economic profit from shallot utilization (US$/year)	1649.16	794.47	868.61	289.51	3601.77
Net income of forage utilization (US$)	56.23	33.85	32.38	19.82	142.3
Economic profit From forage utilization (US$/year)	56.23	33.85	32.38	19.82	142.3
Economic rent of forage utilization (US$ /ha yr.)	29.44	29.44	19.62	19.62	98.14
Economic rent of shallot utilization (US$ /ha yr.)	863.43	690.84	526.43	286.64	2367.35
Marketing margin of byproducts (percent)	11.76	11.76	11.76	11.76	-
Expected value of shallot production (US$/ha)	287.81	230.28	175.47	95.549	789.12
Expected value of forage production (US$/ha)	9.81	9.81	6.54	6.54	32.71
Total expected value of rangeland (US$/ha)	297.62	240.09	182.02	102.09	821.83

Discussion

In this study, given the importance of economic valuation of rangeland products, it was tried to calculate the economic indices related to shallot byproduct utilization using the obtained data in Varnasa rangelands of Naghadeh, Iran. The results showed that there was a significant difference for canopy cover in the studied habitats and the values vary from 49 to 63%. Regarding proximity of units, it seems that they are roughly the same especially in terms of ecological and soil-moisture levels. It is necessary in future studies to determine the physical and chemical characteristics and the moisture content of each location with more certainty; then, it will be possible to discuss them specifically. In order to logical reasoning in this regard, it is necessary to conduct a separate research to study the relationship of environmental factors including soil with shallot distribution.

The results showed that the amounts of shallot production in each site were significantly different (Table 3). Shallot production was variable among the investigated habitats from 282.66 to 93.83 kgh^{-1}. One of the main reasons for the difference in the production of shallots in the study area can be associated with different inventory time. As mentioned before, the dates of the operation and measuring course are not the same and the two week lag of measuring is the most effective factor in shallot production variation. Although it is necessary to consider this topic with more repetition of sampling separately, it is obvious that more attention should be paid to the harvesting time differences in future studies. The results also showed that the average utilization economic rent of the shallot is 1178.78 US$ $h^{-1}y^{-1}$. In this context, Zare *et al*. (2013) has obtained the economic rents derived from the exploitation of Amygdalus (*Amygdalus scoparia*) about 23.53 US$ $h^{-1}y^{-1}$ in rangelands of Chenar-e Naz, Khatam, Iran. Also, Zakeri *et al*. (2014) calculated the economic rents of *Glycyrrhiza glabra* species utilization about 266.71 US$ $h^{-1}y^{-1}$ in rangelands of Tazeh Ghale, Northern Khorasan province, Iran. Croitoru (2007) has reported that the annual economic benefit derived from non-wood forest products in the Mediterranean forest is 44.08US$ h^{-1} and stated that this source is only a

quarter of the harvestable annual profit from them. In this connection, Heshmatol Vaezin *et al*. (2010) had reported that the economic benefit and economic rent were 11.60 US$ and 0.55 US$ $h^{-1}y^{-1}$, respectively.

The other objective of this study was to calculate the expected value of shallot production in habitats. The results showed that the expected value of production shallots in habitats was significantly different; the values varied between 287.81 and 95.54 US$ h^{-1}. Due to significant differences between the means of shallot production in the habitats, the difference of expected value of shallot production of four sites was also normal. Overall, the mean expected value of shallot production in the region is 197.27 US$ h^{-1} that can have a strong role in the economy of local utilizers. In this regard, the expected value of Amygdalus was obtained by Zare *et al*. (2013) about 800.13 US$$h^{-1}y^{-1}$ in Chenare Naz, Khatam. Also, Heshmatol Vaezin *et al*. (2010) had obtained the total expected value of rangeland primary and secondary byproduct about 372.39 US$; the share of Eremurus byproduct is about 6%.

Marketing margin coefficient of shallots utilization was estimated about 11.76%. In this regard, Heshmatol Vaezin *et al*. (2010) reported that Eremurus byproduct marketing margin is about 60% as it is due to seasonal harvest of Eremurus and its high corruption rate. Also, Zakeri *et al*. (2014) reported that the marketing margin of *Glycyrrhiza glabra* is about 50% which is related to the seasonal harvest of *Glycyrrhiza glabra* and purchase of byproducts by a group of the inhabitants who have vehicles and play the intermediary role. Hosseini and Ahugalndari (2007) had found that marketing margin has a direct significant correlation with price at the retail level as well as marketing costs such as labor costs and transportation costs. In other words, the size of the coefficient depends on the type of performed service on the product, corruption rate, selling speed and severity of competition in marketing and performance of the overall market (Kupahi, 2008).

Annual employment in habitat resulting from the shallots operation is equivalent to 0.16 people per year. Heshmatol Vaezin *et al*. (2010) had calculated the share of Eremurus byproduct employment to total employment as about 33%. Also, Zakeri *et al*. (2014) in a similar study have estimated the share *Glycyrrhiza glabra* byproduct out of total employment about 35%. So, if the area has a great surface, utilization of rangeland byproducts particularly the shallot species can play a major role in creating jobs in the region alongside with ranging and forage harvesting.

Conclusion

It is obvious that revenue of shallots should not be paid without examining the impact on the range of possible damage because the harvesting of shallots are completely unprincipled and notwithstanding to the allowable harvesting level. Therefore, it is necessary to consider proper utilization principals of shallot harvesting as an income for the villagers in range management plans. This can prevent the destructive impacts of possible exploitation and overexploitation of this byproduct. Considering the fact that the rangeland function not only provides forage for livestock and byproducts such as shallot but also supplies other functions such as soil erosion control, water conservation, recharge of groundwater, and wildlife protection, it is necessary to count other functions in the related plans. The calculated expected value in this study is only based on the exploitation of the shallot species. But the real value of range could be certainly increased by including non-market

services and products and environmental services. Economic analysis, especially market functions and non-market evaluation of ranges can help to identify real value and functions of this source as well as designing appropriate mechanisms to protect and optimize their utilization in all levels of management.

References

Abdollahpour, M., 2004. Forest diplomacy. Azad University branch of Noshahr and Chalus publication, 196pp. (In Persian).

Aiyeloja, A. A., & Ajewole, O. I., 2006. Non-timber forest products' marketing in Nigeria. A case study of Osun state. *Educational Research and Reviews*, 1(2): 52.

Akbarlou, M., & Nodehi, N., 2016. Relationship between some environmental factors with distribution of medicinal plants in Ghorkhud protected region, Northern Khorasan province, Iran. *Jour. Rangeland Science*, *6*(1), 63-72. (In Persian).

Alexander, S. J., McLain, R. J. and Blatner, K.A., 2002. Socio-economic research on non-timber forest products in the Pacific Northwest. *Jour. Sustainable Forestry*, 13(3/4): 95-103.

Croitoru, L., 2007. Valuing the non-timber forest products in the Mediterranean region. *Ecological Economic*, 63: 768-775.

Daneshvar Ameri, Zh. and Yazdani, S., 2007, Factors affecting marketing margins shrimp. *Iranian Jour. Agricultural Sciences*, 1(2): 125-115. (In Persian).

Ebrahimi, R., Zamani, Z., and Kashi, A., 2008. Genetic diversity evaluation of wild Persian shallot (*Allium hirtifolium* Boiss.) using morphological and RAPD Markers. *Scientia Horticulturae*, 119: 345-351. (In Persian).

Eskandari, N., Alizadeh, A. and Mahdavi, F., 2008. Range management policies in Iran. Poneh Press, Tehran, Iran, 196 p. (In Persian).

Freed, J., 2003. Non-timber forest products in local economies: The case of Mason County, Washington. *Jour. Sustainable Forestry*, 13 (4): 67-69.

Ghahremani-Majd, H., Dashti, F., Dastan, D., Mumivand, H., Hadian, J. and Esna-Ashari, M., 2012. Antioxidant and antimicrobial activities of Persian Shallot (*Allium hirtifolium* Boiss) populations. *Horticulture, Environment, and Biotechnology*, 53(2): 116-122. (In Persian).

Ghodrati Azadi, H., Mahmood Ghaffari, S., Riazi, G. H., Ahmadian, S., and Vahedi, F., 2008. Antiproliferative activity of chloroformic extract of Persian Shallot, *Allium hirtifolium*, on tumor cell lines. *Cytotechnology*, 56:179-185. (In Persian).

Heshmatol Vaezin, S. M., Ghanbari, S., and Tavili, A., 2010. Income of Eremurus (*Eremurus olgae*) and forage production in the Khazangah rangelands of Makoo. *Jour. Range and Watershed Management*, 63(2): 183-195. (In Persian).

Hosseini, S., and Ahugalandi, M., 2007. Economic analysis of marketing margin of Iranian Saffron, the Sixth Conference of Agricultural Economics, 8-9 Nov., Mashhad, Iran. (In Persian).

Jense, G. and Ottisch, A., 2005. Forest influencing the role of non-wood forest products and services. *Forest Policy and Economics*, 7: 309-319.

Khosravi, H., and Mehrabi, A., 2005. Economic Study of Ferula Harvesting in Tabass Region. *Iranian Jour. Natural Resources*, 58 (4): 933-944. (In Persian).

Kupahi, M., 2008. Principles of agriculture economics. Tehran University Publication, 509p (In Persian).

Motamedi, J., Abdolalozde, Z., and Sheidai Karkaj, E., 2016. Field and laboratory methods for grassland and animal production research. Urmia University Publication, 53pp. (In Persian).

Motamedi, J., Alijanpour, A., and Banj shafie, A., 2017. Report of comprehensive project of recognition and utilization of byproducts of rangelands and forests of West Azerbaijan province, Vice Research of Urmia University. 213 pp. (In Persian).

Rahbar, M. Hoseini Tagavi, S. A., Diba, K., and Haidari, A., 2005. *In Vitro* antibacterial activity of Shallot (*Allium ascalonicum*) crude juice. *Jour. Medicinal Plants*, 1(13): 26-29. (In Persian).

Saeed, A., 1995. Fundamentals of practical economics in forest management. Tehran university publication, 339 pp. (In Persian).

Shahraki, M. R., Gholami Baghi, N., Sharafatmandrad, M., & Behmanesh, B., 2015. Rangelands Goods and Services Local People Views and Priorities (Case Study: Hezarjarib Rangelands, Mazandaran Province, Iran). *Jour. Rangeland Science*, *5*(3), 212-221. (In Persian).

Shylajan, C. S., and Mythili, G., 2003. Community dependence on protected forest areas: A study on valuation of non-wood

forest products in a region of India. *Sri Lankan Jour. Agricultural Economics*, 5 (1): 97-122.

Taran, M., Rezaeian, M. and Izaddoost, M., 2006. In vitro antitrichomonas activity of *Allium hirtifolium* (Persian Shallot) in comparison with metronidazole. *Iranian Jour. Publ Health*, 35 (1): 92-94. (In Persian).

Zakeri, E., Tavili, A., and Toloei, S., 2014. Evaluation of financial value of *Glycyrrhiza glabra* utilization in comparison to the income gained from pastures forage of Taze-Ghale rangelands. *Jour. Renewable Natural Resources*, 5(2): 15-26. (In Persian).

Zare, A., Arzani, H., Javadi. S. A., Eslami, M. R., and Baghestani Meybodi, N., 2013. Evaluation of the income of forage products and byproducts of Amygdalus scoparia. *Jour. Biodiversity and Environmental Sciences* (JBES), 3(12): 92-100. (In Persian).

ارزیابی اقتصادی بهره برداری از موسیر در مراتع وارناسای نقده، ایران

جواد معتمدی[الف*]، مرتضی مفیدی چلان[ب]، سعید رحمان پور[ج]، مهشید سوری [د]
[الف]دانشیار پژوهشی، بخش تحقیقات مرتع، مؤسسه تحقیقات جنگلها و مراتع کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران
*(نگارنده مسئول)، پست الکترونیک: j.motamedi@rifr-ac.ir
[ب]دانش آموخته دکتری علوم مرتع دانشگاه علوم کشاورزی و منابع طبیعی گرگان، ایران
[ج]کارشناسی ارشد مرتعداری اداره منابع طبیعی و آبخیزداری نقده، ایران
[د]استادیار پژوهشی، بخش تحقیقات مرتع، مؤسسه تحقیقات جنگلها و مراتع کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران

تاریخ دریافت: ۱۳۹۶/۰۳/۰۳
تاریخ پذیرش: ۱۳۹۶/۰۶/۲۲

چکیده. شناخت محصولات فرعی و ارزیابی اقتصادی بهره‌برداری از آن‌ها، یکی از ملزومات اساسی به منظور تنظیم سند چشم‌انداز بهره‌برداری از محصولات فرعی است. در این راستا، پژوهش حاضر با هدف برآورد شاخص‌های اقتصادی بهره‌برداری از موسیر در مراتع وارناسای نقده انجام شد. برای این منظور در سال ۱۳۹۴ ضمن نمونه‌برداری از پوشش گیاهی و برآورد مقدار تولید موسیر و تولید علوفه در واحد سطح، داده‌های اقتصادی نیز به منظور محاسبه شاخص‌های اقتصادی جمع‌آوری شد. نتایج محاسبات نشان داد، سود اقتصادی حاصل از تولید علوفه برای هر خانوار ۷۱/۱۶ دلار در سال (۲۱۳۴۶۸۴/۱۶ ریال در سال) و رانت اقتصادی حاصله ۹۸/۱۴ دلار در هکتار در سال (۲۹۴۳۷۰۹/۳ ریال در هکتار در سال) برآورد شد. میانگین درآمد ناخالص بهره‌برداری از موسیر در یک دوره برداشت برای هر خانوار حدود ۸۳۸/۲۳ دلار (۲۵۱۴۲۷۰۸/۸۵ ریال) در۵/۷۲ هکتار برآورد شد که پس از کسر هزینه‌های آشکار بهره‌برداری (حمل و نقل)، درآمد خالص هر خانوار در دوره به ۷۶۱/۶۱ دلار (۲۲۸۴۴۹۱/۹۵ ریال) بالغ شد. سود اقتصادی خانوار پس از کسر هزینه‌های پنهان (کارگری) و آشکار (حمل و نقل) از درآمد ناخالص، ۷۲۰/۳۵ دلار (۲۱۶۰۶۸۹۸/۲۵ ریال) و رانت اقتصادی بهره‌برداری از موسیر ۴۷۳/۴۷ دلار در هر هکتار در سال (۱۴۲۰۱۷۳۲/۶۵ ریال در هر هکتار در سال) است. ارزش مورد انتظار هر هکتار از مراتع منطقه از محل تولید موسیر با در نظر گرفتن نرخ تنزیل سه درصد ۷۸۹/۱۲ دلار در هکتار (۲۳۶۶۹۶۵۴/۴ریال در هکتار) و از محل علوفه تولیدی، ۳۲/۷۱ دلار در هکتار (۹۸۱۱۳۶/۴۵ ریال در هکتار) برآورد شد. به همین ترتیب ارزش کل مورد انتظار مراتع منطقه از محل تولید موسیر و تولید علوفه، بالغ بر ۸۲۱/۸۴ دلار (۲۴۶۵۰۷۹۰/۸۵ ریال) برآورد می‌شود که سهم موسیر از کل ارزش مورد انتظار مرتع، ۹۶ درصد است. درآمد بدست آمده از بهره‌برداری موسیر و تولید علوفه به ترتیب ۲۷/۲ و ۱/۳ درصد از درآمد سالانه خانوارهای بهره‌بردار را تشکیل می‌دهند. ضمن اینکه اشتغال سالیانه حاصل از تولید علوفه و بهره‌برداری از موسیر، به ترتیب ۱/۴۴ و ۰/۱۶ نفر در سال برآورد شد که سهم موسیر از کل اشتغال حاصل، ۱۰ درصد می‌باشد. نتایج تداعی‌کننده آن است که بهره‌برداری از محصولات فرعی می‌تواند نقش مهمی در اقتصاد و اشتغال محلی ایفا کند و از افزایش شدت چرا در اراضی مرتعی بکاهد. بطورکلی نتایج این تحقیق لزوم در نظر گرفتن درآمد حاصل از محصولات فرعی در طرح‌های مرتعداری و مدیریت جامع اراضی طبیعی را آشکار می‌سازد.

کلمات کلیدی: ارزش مورد انتظار مرتع، درآمد خالص، رانت اقتصادی، سود اقتصادی، محصولات فرعی مراتع