



## STUDY ON PROPER TIME OF LIVESTOCK ENTRY AND EXIT TO AND FROM RANGELAND IN BARM KHOSHK OF SEPIDAN OR (THE HABITAT OF SEMI-STEPPE FARS-IRAN)

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### ABSTRACT

The rangelands consist of various plants species that each of them has different vegetative and reproductive stages. By doing this study, it was possible to review the plan of grazing management of the zones with similar vegetation to Barm Khoshk of Sepidan - Fars located at 125 km of North West of Shiraz for 5 years (2007-2010). The information such as: the phenology stages and the total height of plant related to 6 rangeland species that have a remarkable role in forage production of considered rangeland for 20 weeks and during 4 years were collected and recorded in the special sheet forms. For determining the proper time for exit of livestock from rangeland, the method of exploited percentage evaluation of rangeland main species and comparing them with their allowed exploitation limitation were used. According to the obtained results, there are some different in terms of the process of phenology in the reviewed years between 6 rangeland species. Also, according to the obtained results, the allowed exploitation limitation rangeland plant species is estimates 25 to 50 percent for most of the species and this allowed exploitation amount in dry and wet years is obtained in different time interval; it is recommended that in dry years, early September, and in wet years, late September should be considered as a proper time for livestock exit. That according to the executive calendar, entry and exit time of livestock in the schedule has a different between 2 to 3 weeks.

**Keywords:** rangeland readiness, livestock entry, rangeland, livestock exit, phenology, grazing management.

### INTRODUCTION

One of the main problems of Iran rangelands is lack of grazing management that finally lead to non-normative and untimely exploitation of rangeland forage and also over capacity grazing. Readiness of the rangelands requires to enough time be given to plants to save the material and food for their next growth. Failure to observe this matter, leads to a gradual decrease of plants production and reproductive power; and accordingly their complete destruction one of the proper solutions to detect the exploitation time of the rangeland is using the phenology study, understanding and reviewing on the date of various biological phenomena occurrence in plants. To detect rangeland readiness for entry of livestock, collection of plants phenology and soil of rangeland data is required. Data of soil moisture, the plant total height and phenology stages should be considered. To determine the date of livestock exit from rangeland, the method of exploited percentage evaluation of the main rangeland species and comparing them with their allowed limitation exploitation is used. Without knowing these characteristics in a rangeland, determining grazing season and grazing management and livestock is not possible. Despite availability of general information about the vegetation and grazing season, any scheduled work does not have done yet. Start of great and key plan of "livestock and rangeland balance" (one of four key plans of related Ministry) and the direct responsibility of Researches Institute regarding grazing season, make the necessity of doing such research, more important. By doing this study, it will be possible to review the grazing management plan of rangelands with similar vegetation. Timely livestock

enter and exit to and from rangeland, lead to appropriate exploitation and improvement of the rangeland status.

### LITERATURE REVIEW

Up to now different studies in the field of rangeland plants phenology in Iran and other countries have been conducted. Some of these studies are as follows: All studied plants start their fall growth in early October; and during fall and winter have a slight growth; while their maximum growth occurs at the end of spring. Some of species by beginning of winter become dry or their growth stops; and in spring again start to growth. Phenology of various species is different and some of them in each growing season blossomed twice. Frank and Hofmann (1989) reviewed the relation between grazing and cumulative temperature of growth stages with occurrence of phenology phenomenon of perennial millet.

These researchers reported that collection of temperature that called (Growing Degree-Days) has a remarkable effect on occurrence of plants phenology stages. But, the effect of grazing on occurrence of phenology stages is not sensible. The regression analysis of phenology stages with growth degree - days showed that a linear relation is between the phenology stages and accumulative temperature; but grazing had a slight effect on this relation. Frank Varis (1996) conducted a study on the effect of soil water, the amount of nitrogen and Growing Degree-Days on the formation of phenology stages of *Agropyron desertorum* (Fisch) and *Agropyron smithii* Rydb. (Love) species. These researchers concluded that the forage production, substantially is a function of soil water and nitrogen amount in it. While the phenology



of mentioned species especially from the beginning of growth to the stage of flowering are influenced by temperature. Habibian (1995), in the compatibility test of rangeland plants resistant to drought in Fars Dasht Arzhan concluded that in terms of phenology, the species of *Agropyron trichophorum* in comparison with all studied species, have delay and its complete drying continues until early October. Tayebi Khorami (1997), reviewed phenology of two species of *Elymus* in north of Fars and concluded that the species of *Elymus hispidus* var. *villosus* about one week before the other species start its vegetation. But growth of *Elymus pertenuis* species is sooner and starts its flowering and seed falling stages sooner. Saeed Far (2000) studied on the phenology of *Bromus tomentellus* species in Hana station in Samirum with the height of 2270 m from sea level. He reported that this species start its vegetation from second half of March and terminate till first decade of May. The clusters appear from mid- May and this process continue until 10 to 15 days. Flowering of this plant start from June and complete within 10 days. Maturity of the seeds start from second half of June and take up to mid July and seeds falling starts from the third decade of July. This species after seed falling has a very slow growth and its dormancy start from mid December. Salehi et al.(2000) study on phenology of 21 rangeland species in Khozastan and concluded that the species belonging to various species according to physiology and morphology features, pass their biological periods in different times. And the species related to a family have more conformity with each other in the date of phenology phenomenon occurrence. Akbarzadeh (2000) studied on the phenology of *Bromus tomentellus* in 1994 to 1997 Hamand Abesard station with 1960 m height from sea level. In this study, he mentioned 8 stages of phenology under title of vegetative stage, heading stage, flowering stage, formation and milky stage of seed, willing stage of plant, temporary dormancy stage and fall growth stage. This study showed that the under study plant start its vegetation from end of March to early April and complete it until mid- May; the cluster appears from mid- May to end of this month; and flowers from end of May to early June. From mid-June to mid-July the seeds form and mature. By early August seeds fall and the summer dormancy starts. In some years it is possible that in fall the plant has a little regrowth. Sadeghian (2001) in Ghorogh of Dehbid with 2450 m height from sea level has studied on the phenology of *Bromus tomentellus* for three years. He reported that the vegetation of this plant depends on the different years from mid March to early May and cluster stage is from 11<sup>th</sup> to 20<sup>th</sup> May; and the stage of seed formation and its maturity period is from 15<sup>th</sup> June to 10<sup>th</sup> July.

Gheisarani (1999) reviewed the phenology of this species in Kharkeh - Sanandaj located at 2070m from sea level for 3 years. He reported that the mentioned species from late- March start to growth and its vegetation terminates till first decade of May and the clustering stage starts from second decade of May and finishes up to mid-June. Flowering stage starts from early June and continue to mid- June; and ultimately in early-July the seeds start to

form and to late- July seed maturity finishes. From late-July seed falling starts and continues to first decade of August. This species early in August entry to summer dormancy. From early-November fall regrowth starts and (in some years) and continues to early- December. Finally after passing this stage, the winter dormancy starts and continues to late March.

## MATERIALS AND METHODS

The rangeland bromine dry is located in 30 km Sepidan in an area of 345 hectares. It is as a summering rangeland; that provides required forage of more than 115 livestock units for 90 days. The exploitation season is from 15<sup>th</sup> June to 15<sup>th</sup> September. The number of explicator is 4 nomadic families with 400 sheep and 130 goats. They are in mentioned rangeland for 4 month and for 2 months are in traffic path in Mian Band rangeland and the rest of year feed their livestock by manual feeding and remaining forage of farms. The site is located on the map No. I district 6350 with scale of 1:50000, between geographical longitude 51 degree and 50 minute to 51 degree and 55 minute and latitude 30 degree and 25 minute to 30 degree and 30 minute. The average precipitation of site is 758 mm and the average of annual temperature is 11.9 °C, the soil texture is sandy clay loam with pH=7.9. The site is mountainous with height average of 2608 m from sea level. The type of rangeland is *Astragalus* – Grasses that its status is estimated mean with negative trend. To determine the readiness of rangeland for entry the livestock, gathering of data about plants phenology and rangeland soil is required. For this purpose, at first the list of important rangeland plants in the site was prepared and then, from each species, 10 plants were selected. The data related to phenology stages and total height of plant for each plant in 15 days duration in vegetative stage and 7 days in reproductive stage was measured and registered in a special form.

The considered phenology stages as follows:

- Start and end of vegetative stage
- Start and end of flowering (mean) emergence of flower stems and cluster regarding millet and in forbs and bushes, emergence of flower seedlings were considered.
- Start and end of seed maturity stage
- Stagnation and shrivel period
- The height in millet, and for forbs the total height from soil surface; and in bushes the mean height of vegetative mean of current year on the bush, and in lying plant the length of vegetative members were considered.
- Soil moisture

Soil moisture was evaluated seemingly. In a way that if the moisture of soil was as much that livestock could walk on the rangeland; and if a man walk on that and no clay stick to shoes; and in case livestock entry and no distinctive footprint remain from that. To determine this important matter, from the beginning of growing season, once a week the site is visited and the data was recorded in the special forms for this purpose.



## RESULTS

### *Hordeum bulbosum* species

This species according to weather conditions of the zone, especially temperature of environment, starts its growth from the end decade of March. In this condition the minimum temperature is 4 °C and the maximum was 14/9 °C. In this stage, plant in terms of water and moisture has no any problem and just proper temperature is as a factor for starting growth. The vegetative of this species gradually start from the last decade of March and continue till late May. In this time, the minimum temperature is 13°C and the maximum temperature is 22/9 °C. The duration of this period depends on the temperature of that year and especially precipitation and moisture of previous months and especially previous years. Flowering starts from late May along with increasing of temperature and continues till mid June and during this period the minimum temperature is 18.3 and the maximum is 28.9 °C. Duration of this period is about 20-25 days and seeding of this species starts from mid June and gradually by reducing moisture of weather takes till late July. At this time, the minimum temperature is 20/9 °C and the

maximum temperature is 31/9 °C. The seeds start to fall from early August. Duration of this period that coincides with heat and drought is about 7 to 10 days. After that, the plant became quite dry and immediately after temporary dormancy, plant winter dormancy starts and till start of plant reactivation in next year continues. So, this species does not have fall regrowth. After seed falling, plant growth become relative and slow and gradually aerial parts of plant become drought and so-called its temporary dormancy starts. In this period, the minimum temperature is 17/8 °C and the maximum temperature is 29 °C. The average of maximum height plant during vegetative stage is 74/2 cm. To determine the proper time of livestock exit according to obtained results of reviewing, the allowed exploitation limitation of *Hordeum bulbosum* species that was estimated 50 percent, It is recommended that in drought years, due to shortening growth period and production decline and getting to 50 percent of allowed exploitation limitation in lesser time, early September, livestock should exit from rangeland .While, according to grazing allowance, the proper time for livestock exit from rangeland is considered mid-September.

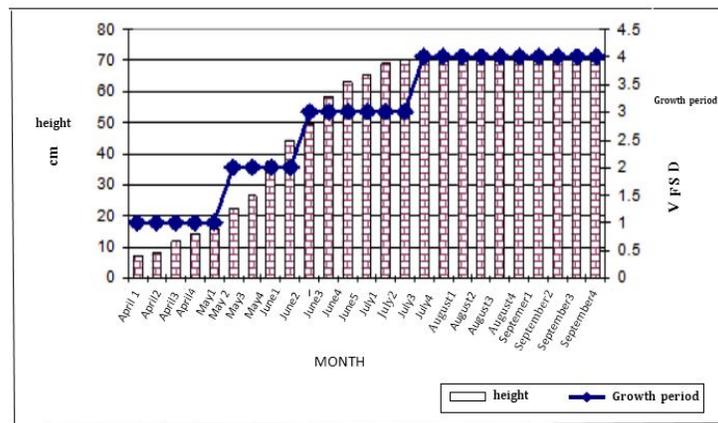


Figure-1. Height and vegetative stage of *Hordeum bulbosum* species.

### *Astragalus adsendance* species

This species according to weather conditions of the zone, especially temperature of environment, starts its growth from early May. In this condition the minimum temperature is 13 °C and the maximum temperature is 29 °C.

In this stage, the plant in terms of weather and moisture does not have any problem and only proper temperature is considered as a factor for start of growth. Vegetative of this species starts gradually from late May and continues till mid- July. At this time, the minimum temperature is 18/3 °C and the maximum temperature is 28/9 °C. The duration of this period depends largely on the temperature of the same year and especially precipitation and moisture of previous months and especially previous years.

Flowering starts from mid- July along with increase of temperature and continues till late- August. At

this time the minimum temperature is 19/8 °C and the maximum temperature is 30/6 °C.

The duration of this period is 40-45 days. Seeding stage in this species start from mid- August and gradually by reduction of moisture, takes until mid- September. At this time, the minimum temperature is 17/8°C and the maximum temperature is 29 °C. The seeds start to fall from early September. Duration of this period that is coincides with heat and drought takes approximately 20 to 30 days.

Then, the plant becomes quite dry and immediately after temporary dormancy, the winter dormancy starts and continues until start of regrowth in next year.

So, this species does not have fall regrowth. After seed falling, plant growth become relative and slow and gradually aerial parts of plant become dry and so-called go to temporary dormancy.



In this period, the minimum temperature is 12/6 °C and the maximum temperature is 23/7°C. The average of maximum plant height during the growth period is 64/2 cm.

In 2008, according to remarkable reduction of precipitation and drought, the phenology period starts sooner and finished sooner as well.

Also, to determine proper time to exit livestock from rangeland, according to obtained results of study on

allowed exploitation limitation for *Astragalus adsendance* species was estimated 25 percent.

It is recommended that in drought year, according to reduction of growth period and production and getting to 25 percent of allowed exploitation limitation in lesser time, in early September, livestock should exit from rangeland .While, the proper time for livestock exit from rangeland, according to grazing allowance, is considered mid- September.

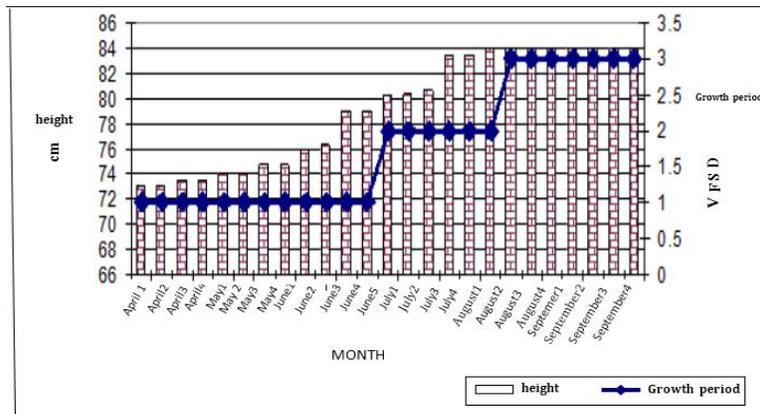


Figure-2. The height and growth period of *Astragalus adsendance* species.

#### *Centaurea aucheri* species

This species according to the weather conditions of zone especially environment temperature, start its growth from mid-April. In this condition the minimum temperature is 5/3 °C and maximum temperature is 14°C. In this stage, plant in terms of water and moisture does not have any problem and only proper temperature is considered as a factor for starting the growth. Vegetative growth of this species gradually starts from early May and continues till mid- June. At this time, the minimum temperature is 18/3 °C and the maximum temperature is 25/9 °C. The duration of this period, largely depends on the temperature of that year and especially precipitation and moisture of previous months and especially previous years.

Flowering start from early June along with increase of temperature and continues till mid- July. During this period, the minimum temperature is 20/9 °C and the maximum temperature is 31/9 °C.

The duration of this period is about 30-35 days. Seeding in this species starts from early July and gradually by decrease of weather moisture takes to early- August; and at this time, the minimum temperature is 19/8 °C and the maximum temperature is 30/6 °C. The seeds start to fall from mid- July.

Duration of this period is coincides with heat and drought that takes 10 to 20 days. Then the plant becomes quite dry and immediately after temporary dormancy, the winter dormancy starts and continues until start of plant regrowth in next year. So, this species does not have fall regrowth. Then after seed falling, the growth of plant become relative and slow and gradually aerial parts of plant become dry and so- called the temporary dormancy starts.

In this period the minimum temperature is 19/8 °C and the maximum temperature is 30/6 °C. The average of maximum height of plant during the growth stage is 32 cm.

In 2008, according to remarkable decrease of precipitation and drought, the phenology period starts sooner and also finishes sooner. Also, to determine the proper time for livestock exit from rangeland according to obtained results in review of allowed exploitation limitation for *Centaurea aucheris* species is estimated 75 percent

It is recommended that in drought year, due to shortening growth period and decrease of production and getting to 75 percent of allowed exploitation limitation in a lesser time, in early September livestock should exit from the rangeland. While, the exit time of livestock according to grazing allowance is considered mid- September.

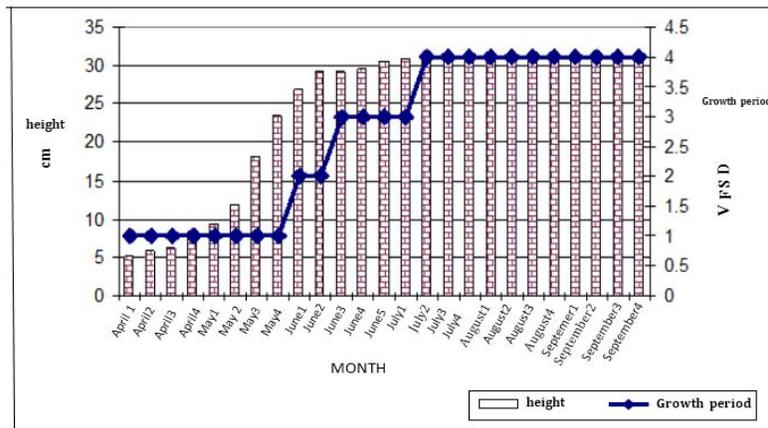


Figure-3. The height and growth period of *Centaurea aucheri* species.

### *Prangos ferulaceae* species

This species according to the weather conditions of zone, especially environment temperature, start its growth from early April. In these conditions the minimum temperature is 5/3°C and the maximum temperature is 14°C.

In this stage, the plant in terms of water and moisture does not have any problem and only proper time is considered as a factor for starting of growth.

The vegetative growth of this species gradually starts from early May and continue till late May. At this time the minimum temperature is 13°C and the maximum temperature is 22/9 °C.

The duration of this period is largely depends on temperature of that year and especially precipitation and moisture of previous months and especially previous years. Flowering starts from mid-May along with increase of temperature and continues till mid- June. During this period the minimum temperature is 18/3°C and the maximum temperature is 28/9 °C.

The duration of this period is 30-35 days and seeding of this species starts from mid- June and gradually continues by decrease of air humidity till early July; in this period, the minimum weather temperature is 20/9 °C and the maximum temperature is 31/9°C.

The seeds start to fall from late June. The duration of this period that is coincides with heat and drought is approximately 10 to 20 days.

Then the plant become quite dry and immediately after temporary dormancy, the winter dormancy starts and continue to start of plant reactivity in the next year; so this species has not fall regrowth.

After falling the seeds, the growth of plant become relative and slow and gradually aerial parts of plant become dry and so- called enter to temporary dormancy. In this period, the minimum temperature is 19/8 °C and maximum temperature is 30/6 °C. The average of maximum plant height during the growth period is 79 cm.

In 2008, according to remarkable decrease of precipitation and accordingly drought, the phenology period start sooner and with the same proportion has finished sooner as well. Also, to determine the proper time for livestock exit from rangeland according to obtained results of study on allowed exploitation limitation for *Prangos ferulaceae* species is estimated 75 percent. It is recommended that in drought years, according to shortening of the growth period and production decline and achieving to 75 percent of allowed exploitation limitation in lesser time, in early September, the stock exit from the rangeland.

The time of livestock exit according grazing allowance is considered mid September.

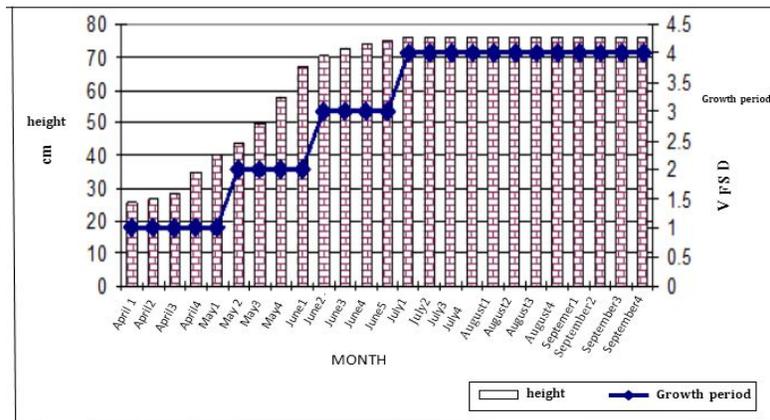


Figure-4. Height and growth period of *Prangos ferulaceae* species.

### *Medicago sativa* species

This species according to the zone weather conditions, especially environment temperature, starts its growth from mid-April. In this condition, the minimum temperature is 5/3°C and a maximum temperature is 14 °C.

In this stage, plant in terms of water and moisture has not any problem; and only proper temperature is considered as a factor for starting the growth.

Vegetative growth of this species starts gradually from early May and continue to early June. At this time the minimum temperature is 13°C and the maximum is 22/9°C. Duration of this period depends on the same year temperature especially precipitation and moisture of previous months and especially previous years.

Flowering starts from early June along with increasing temperature and continues till early July. During this period, the minimum temperature is 18/3°C and maximum temperature is 28/9 °C.

Duration of this period is about 30-35 days; and seeding of this species starts from late June and gradually by reducing of weather moisture takes till early September; at this period, minimum temperature is 17/8 °C and maximum temperature is 29 °C. The seeds start to fall from late July.

Duration of this period that is coincides with heat and drought is about 40 to 50 days. After that the plant become quite dry and immediately after temporary dormancy, plant winter dormancy start and continues till start of plant reactivity in next year. So, this species does not have fall regrowth. After seed falling, plant growth become relatively and slow and gradually aerial parts of plant become dry and so-called start its temporary dormancy. In this period the minimum temperature is 17/8 °C and the maximum temperature is 29 °C.

The average of plant height maximum during the growth period is 75.8 cm. In 2008, according to significant reduction of rainfall and drought, the period of phenology starts sooner and with the same proportion has terminated sooner.

Also, according to the obtained results of studding on allowed exploitation limitation for *Medicago sativa* species that is estimated 50 percent, to determine the appropriate time to exit the livestock, it is recommended that in drought years, due to shortening growth period and production decline and getting to 50 percent of allowed exploitation limitation in lesser time, in early September, livestock should exit from rangeland.

While, proper time of livestock exit from rangeland according to grazing allowance, is considered mid-September.

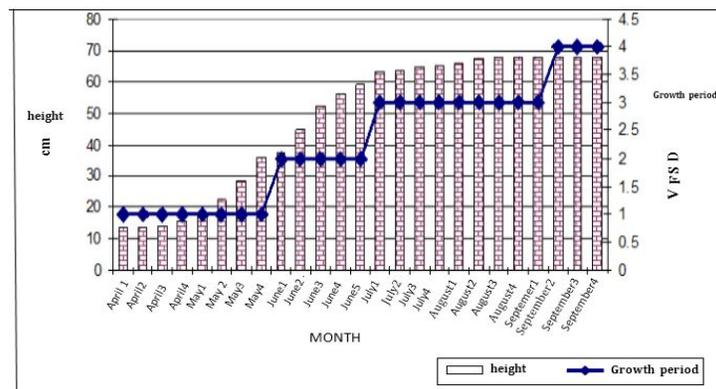


Figure-5. The height and growth period of *Medicago sativa*.



### *Eryngium billardieri* species

This species according to the zone weather conditions, especially temperature, starts its growth from mid-April. In this condition, the minimum temperature is 5/3°C and a maximum temperature is 14 °C.

In this stage, plant in terms of water and moisture has not any problem; and only, the proper temperature is considered as a factor for starting the growth. The growth period of this species starts gradually in early May and continues till late June.

At this time, the minimum temperature is 18/3 °C and the maximum temperature is 28/9 °C. Duration of this period depends on the temperature of the same year and especially rainfall of previous months and years.

Flowering starts from late June along with rising temperature and continues till late July. At this period the minimum temperature is 20/9 °C and maximum temperature is 31/9 °C.

Duration of this period is about 30-35 days; and seeding of this species starts from late July and gradually by reducing of weather moisture takes till mid September. At this period, minimum temperature is 19/8 °C and maximum temperature is 30/6 °C. The seeds start to fall from early September.

Duration of this period that is coincides with heat and drought is about 30 to 40 days. After that, the plant

become quite dry and immediately after temporary dormancy, plant winter dormancy starts and continues till start of plant reactivity in next year. So, this species does not have fall regrowth.

After seed falling, plant growth become relatively and slow and gradually plant period the minimum temperature is 12/6 °C and the maximum temperature is 23/7 °C.

The average of maximum height plant during vegetative stage is 71.8 cm. In 2008, according to the significant reduction of rainfall amount and drought, the phenology period starts sooner and with the same proportion has terminated sooner as well. Also, to determine proper time of exit livestock from rangeland according to obtained results in study on allowed exploitation limitation for *Eryngium billardieri* species that was estimated 25 percent, It is recommended that in drought year, according to reduction of growth period and production and getting to 25 percent of allowed exploitation limitation in lesser time, in early September, livestock exit from rangeland.

While the proper time for livestock exit from rangeland according to grazing allowance, is considered mid- September.

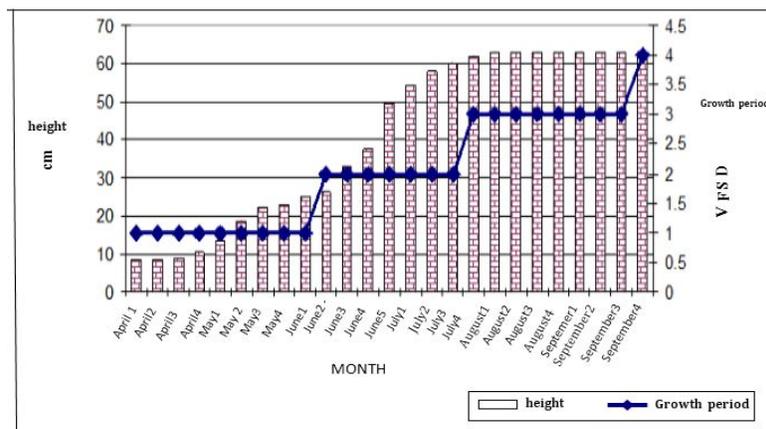


Figure-6. The height and growth period of *Eryngium billardieri* species.

## DISCUSSION AND CONCLUSIONS

*Astragalus adsendance* species grow in form of vegetative- bush. This bush because of having high adaptation power with drought conditions and different temperatures is found abundantly in semi- steppe rangeland of Fars in form of main elements of the type.

The domain of its distribution in the districts with different precipitation rate and various soils is different; that due to palatability of top branches and especially its seeds in mid to late growth season is grazed by goat and is used lesser by sheep.

Study of this species phenology shows that the most proper time for starting the grazing is late June to first half of August.

The most proper time for gathering the seeds of this species is late August to second half of September.

*Hordeum bulbosum* species has a growth in form of perennial gross vegetative. This species due to high adaptation power with drought conditions and low temperature is found abundantly in form of main elements in semi steppe rangeland in Fars province.

Its distribution domain is in the districts with 250 to 800 mm precipitation, aerial members and also the bulb of this species that is removed from soil by sheep during growth season is used in large quantity.

The obtained results of study on this species show that the most proper time for start of grazing is late May and can be continue till first half of August. The best



time for gathering this species seeds is late June to late July.

*Medicago sativa* species grows in form of perennial forb. This species due to its goodish adaptation power with drought conditions and different temperature is found in semi steppe in form of the species along with various types of semi steppe rangelands in Fars province.

This species due to high palatability is grazed strongly especially in early and mid of growth season by livestock.

The special feature of this species is having vegetative different forms simultaneously; it means that at the same time in the species, flower and different stages of seed can be seen.

In total, study on this species phenology shows that the most proper time to start grazing is early June to late July. The best time for gathering seeds of this species is mid June to mid July.

*Prangos ferulaceae* species grows in form of perennial forbs. This species due to its goodish adaptation power with drought conditions and different temperature is found in semi steppe, in form of the species along with various types of semi steppe and high rangelands of Fars province.

Consumption of this species is mostly indirect that after harvesting and saving along with the other species is used for consumption in future seasons.

The obtained results of study on this species show that the most proper time to start grazing is mid - May to mid -June. The best time for gathering this species seeds is early June to second half of June.

*Eryngium billardieri* species grows in form of perennial forbs. These species due to its goodish adaptation power with drought conditions and different temperature in semi steppe rangeland of Fars is found in form of the species along with various types of semi steppe rangelands in Fars province.

Some parts of leaves and top branches are consumed by livestock especially goat. In early and mid growth season, at first, top parts of the plants such as flowers and then leaves are grazed too much by livestock.

The obtained results of study on this species show that the most proper time for start of grazing is late June and can continue till early August. The best time for gathering this species seeds is early July to late August.

*Centaurea aucheri* species grows in form of perennial forbs vegetative. These species due to its goodish adaptation power with drought conditions and different temperature is found in semi steppe rangelands of Fars province in form of strain along with various types of semi steppe rangelands of Fars province.

Growth of this species is in social form and in physiological hard conditions such as high slope can largely causes soil stability and prevent soil erosion. This species due to relatively palatability is grazed strongly especially in mid and late growth season by livestock.

In total, obtained results of study on this species phenology show that the most proper time to start grazing is early June and it can continue till late July. The best

time for gathering this species seeds is mid June to late July.

In general, according to phenology activity diagrams, 6 selected species in studied years show that due to drought and high temperature of environment in some years (2008, 2009 and 2010) most of Phenological stages are done in a short time. So that, since the end of seeds falling till start of temporary dormancy and regrowth ( in case of lack of rainfall in autumn to winter dormancy) the plant spends a long time in the state of stagnation. This matter especially in very dry years such as 2008 occurs. In 2007 that is considered as a year with average moisture; or relatively as a wet year, the duration of growth period and plant activity and also fall regrowth in some species is longer; and in the rest years that are considered as dry years with below average rainfall (2009 and 2010), the stages of plant phenology starts about 2 to 3 weeks sooner; and as the same time, terminates sooner than the wet year. And in this regards, the duration of using the rangeland in drought year reduce about 6 weeks and vice versa in wet year it increases.

According to plan grazing allowance, the grazing season is considered from 15<sup>th</sup> of June to 15<sup>th</sup> of September. That according to the difference of species phenology period and also the humidity available to the plant and accordingly production power and exploitation allowed limitation of plant species in the zone, the proper time for livestock entry in drought year is recommended early June and the appropriate time for livestock exit is in early September; and in wet years the proper time for livestock entry to rangeland is late June and the livestock exit proper time is late September.

As the soil moisture in wet year status continues up to early June and the conditions of livestock entry in terms of this index, after this period is prepared, the soil moisture is not as a limiting factor.

In 2009 and 2010, despite lesser precipitation than average, according to raining at early growth season, the phenology period compared with 2008 started later and finished later as well. In this regard in the year that precipitation rate is close to average, the proper time for entry the livestock to rangeland is mid June; that is recommended according to grazing calendar; and this time in drought year changes to early June and in wet years changes to late June as well.

The moisture of soil is not as a limiting factor because maximum to early June the condition of livestock, in terms of soil moisture is prepared. The obtained results, are quite comply with the obtained results of Cheshmeh Anjir Fars zone; and explain the effect of drought and wet conditions on the time changes of livestock entry and exit to and from the rangeland.

## REFERENCES

- Akbarzadeh, Morteza. 2000. The Study on Rangeland Plants Phenology in Central Alborz Zone, Technical Report of Research Plan, Forests and Rangeland Researches Institute.



Frank A. B. 1996. Evaluating Grass Development for Grazing Management. *Rangelands*. 18(3).

Frank A. B. and L. Hofmann. 1989. Relationship among Grazing Management, Growing Degree-days and Morphological Development for Native Grasses on the Northern Great Plains. *J. Range Manage.* 42(3): 199.

Gheisaranii, Farhang, 1999. Review of Phenology of the Most Important Rangeland Plants in Cold Mountains of Kurdistan. Journal No. 47 of Forests and Rangelands Researches Institute.

Habibian, Seyed Hamid. 1995. Adaptation Review of Rangeland and Forage Plants Resistant to Drought in Dashte Arzhan Fars, Final Report of Research Plan, Fars Livestock Affair and Natural Resources Research Center, Shiraz.

Sadeghian Sara. 2001. Review of the Most Important Rangeland Plants of Ghorogh of Dehbid. Research Technical Report, Forests and Rangelands Researches Institute.

Saeed Far, Mostafa and Mohsen Rasti. 2000. Study on Rangeland Plants Phenology in Hana Semirom Zone, Publications of the Forests and Rangelands Research Institute, Magazine No. 231, Tehran, pp. 79-120.

Salehii, Hossein Hoveizeh and Sedigheh Yousef Na'a naei, 2000. Phenology of Local Rangeland Species in Khozestan Warm Steppe Zone and Semi- Steppe (unpublished).

Tayebi Korami, Mohammad. 1997. Review of some Ecologic Features of Two Rangeland Species of *Elymus pertenuis* (C.A.Mey.) Assadi and *Elymus hispidus* var. *villosus* (Hask.) Assadi in brnches of Kor Zone and Sivand (north of Fars), master thesis, Natural Resource College, Tehran University. p. 191.