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Archaeological evidence of prehistoric grassland systems in the Southern Aravallis, Rajasthan, India

S.K. SHARMA[1*], A. SARSAVAN[2] AND M. PAWAR[2]

[1]*14-15, Chakriya Amba, Rampura Circle, Jhadol Road, Post- Nai, Udaipur -313031, Rajasthan, India*

[2]*Foundation for Ecological Security, Plot No-13, Sector-E, Sardar Vallabhbhai Patel Awasiya Yojana Phase-2, Salaiya, Bhopal, Pin- 462 039, Madhya Pradesh, India*

[*]*sksharma56@gmail.com*

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ABSTRACT

The cup like structures that have been excavated by the ancient men on the rocks are called 'cup marks' or 'Cupules'. The cupules are present at many places in the Aravallis, from its northern part to southern and a good numbers are seen near Jhalo-Ka-Kalwana (Gogunda tehsil) in southern Aravallis in Udaipur district. The confirmed age of the cupules seen in Jhalo-Ka-Kalwana area is not exactly known. These cupules seem contemporary with the primary grasslands of the area. It has been predicted that the cupules of Jhalo-Ka-Kalwana area may be date back to 10,000 to 20,000 years. It indicates that the grasslands confined around Jhalo-Ka-Kalwana on certain piedmonts may be 10,000 years old or in their existence. The authors invite further studies to establish the age of the grasslands through historical evidence.

Key words: Gogunda tehsil, grassland, prehistorical status, Rajasthan, Southern Aravallis

INTRODUCTION

Rajasthan is the largest state of Indian Union which is situated towards the North Western part of the country between 23^0 3' and $30^0$12' N latitude and 69^0 30' and 78 17' E longitude (Shetty and Singh, 1987). The Aravallis are an important feature of the state which is a folded and residual mountain chain which is bisecting the state into two unequal parts. This mountain chain is present across four states of the country namely, Gujarat, Rajasthan, Haryana and Delhi. The Aravallis are well known for their forests and grasslands. As per Champion and Seth (1968) the grasslands of Aravallis in Rajasthan are $5/DS_4$ (Dry grassland), which is a degraded stage of Dry Deciduous Forests.

Rajasthan is rich in grass flora. More than 300 species of grasses are known from the geographical limits of Rajasthan (Shetty and Singh, 1993; Kelkar, 2009; Kotiya et al., 2020). Dabadghao and Shankarnarayan (1973) have classified grasslands of India into five types namely, *Sehima-Dichanthium, Dichanthium-Cenchrus-Lasiurus, Phragmites-Saccharum-Imperata, Themeda-Arundinella* and Temperate alpine. Rajasthan possesses first two types of grasslands. The remaining types are not present in Rajasthan as they are mainly confined to Himalayan region of North and North Eastern part of India. The *Dichanthium-Cenchrus-Lasiurus* grassland is mainly confined to Thar desert, west of the Aravallis while *Sehima-Dichanthium* grass land is confined to the Aravallis and east of the Aravallis up to Hadoti zone of the state.

A considerable amount of scientific literature is available on the grasslands of Rajasthan but no literature is available about the age of the grasslands, how old they are? Answer of this fact is missing in the scientific literature of forestry and botany. Though, records of the recent past of the grasslands are available but prehistoric information are missing.

MATERIALS AND METHODS

Many sites of archeological importance like Panchmadhi and Gandhisagar Wildlife Sanctuaries in Madhya Pradesh; Shilakhadi and Mangar Bani area in Faridabad district in Haryana; Konkan area in Maharashtra; Bijoliya and Bundi area in Rajasthan were surveyed. Rock arts of prehistoric human are available here and there in these sites. Scientific literature related to these sites were scanned to draw the information about status of prehistoric grasslands. Shilakhadi, Mangar and Gandhisagar are present close to Rajasthan. Probably, to and fro movement of ancient men was possible among these sites during the prehistoric time.

Our main focus was on the Gogunda tehsil of Udaipur district in southern Aravallis. Hence, grasslands of the area were studied extensively. Rock arts were also searched in the caves, overhang cliffs and sheltered places. Help of local tribals was taken to probe the remote areas. First author, being a retired forest officer, used his contacts and skill to explore the potential sites in the deeper forest areas. Wherever a rock art was traced, the status and composition of the grassland around the site were studied. GPS was used to record the co-ordinates of the sites and photographic evidences were taken.

Observations

Forested area, grasslands and sacred groves were explored extensively. Forest patches near many sacred sites are still in good condition and available without or with least disturbances and damages. These can be considered as "Reference Forests" to compare with old primary forests and today's secondary forests.

While wandering in the forests and grasslands, the authors found rock art at many places in Gogunda tehsil in Udaipur district. This area is confined to southern Aravallis. Though, we find rock arts at many places but we focused on Jhalo-Ka-Kalwana village landscape (Fig. 1-4). Details of the rock art of the village along with related information is given below in Table 1. The rock arts were carefully examined and the details are shown in Table 2.

Table 1. Rock art site locations at Jhalo-Ka-Kalwana village, Gogunda tehsil, Udaipur district

Location No.	Nearest village	Co-ordinates of rock art site	Types of rock art	Vegetation type and spread in surrounding landscape	
				vegetation type	Appx. area (in ha.)
1	Jhalo-Ka-Kalwana	24.960213 N, 73.446622 E	Cupules (cup marks) and carved sloth bear pugmark	Grassland	100
2	Jhalo-Ka-Kalwana	24.960212 N, 73.443802 E	Cup marks	Grassland	Continuation of site 1
3	Jhalo-Ka-Kalwana	24.958081 N, 73.442056E	Cup marks	Grassland	Continuation of site 1
4	Jhalo-Ka-Kalwana	24.960212 N, 73.443802 E	Cup marks	Grassland	Continuation of site 1

Table 2. Details of rock arts seen in Jhalo-Ka-Kalwana village

Location No.	Type of surface of the rock on which art is present	Comparison of surface of the rock and surrounding terrain	Visibility of the rock having art	Location of the rock having art
All locations viz., 1,2,3,4 (as given in Table 1)	Flat exposed rock on the ground. Primary surface is rough	Rock surface and surrounding surfaces having more or less same level	Clearly visible from all directions	Present on a piedmont

Fig. 1. A flat rock having depiction of sloth bear pug marks and cupules

Fig. 2. Enlarged pug mark of the sloth bear

Fig. 3. Site of rock art depicting cupules (cup marks)

Fig. 4. Closeup of a cup mark

RESULTS AND DISCUSSION

During the present study, rock art of prehistoric period was found at Jhalo-Ka-Kalwana village in Gogunda tehsil of Udaipur district. The study area is a hilly zone and many parallel mountain chains run broadly in South to North direction. The study site is a piedmont of low height, occupied by the rolling grassland which is $5/DS_4$ dry grassland (Champion and Seth, 1968). According to Dabadghao and Shankarnarayan (1973) it is *Dichanthium – Sehima* grassland type. A high mountain called 'Jarga Parvat (Jarga hills)' is present nearly one kilometer away towards eastern side of the study area which possess the second highest peak of Rajasthan after Mount Abu hilly zone. Dense forest cover is present throughout the whole Jarga hills. The forest type on the Jarga hills is mainly 5A-Southern tropical dry deciduous forest (Champion and Seth, 1968). The river Banas flow near the Jarga hills.

During the survey of the forest and grassland area under study, a thought came into the mind of the authors, whether the grassland of Jhalo-Ka-Kalwana village landscape is primary or secondary

in its origin ? When a forest is destroyed, grasses start their succession and in due course of time, a grassland comes into existence. Such grassland is called a secondary grassland. If a grassland is historic or prehistoric in origin, it is called a primary grassland. Thus, the question arises; whether the above study area grasslands are primary grasslands or secondary grasslands? It needs further studies.

Rock art seen at Jhalo-Ka-Kalwana area, provided an important clue about the nature of the local grassland. Rock art of location 1 is very interesting. Here, a flat rock having depiction of sloth bear *(Melursus ursinus)* pugmarks and more than one dozen cupules is worth seeing. The rock is situated towards the top zone of a piedmont. Extensive grasslands are present on different piedmonts of varying heights around this location. Presence of these cupules (cup marks) and sloth bear pugmarks on the flat rocks at location 1,2,3 and 4 indicate that today's visible grasslands of the area are of primary nature. They are not the result of modern destruction of the forest cover but their presence is prehistoric. It is evident from two reasons:

The cup marks are present on the primary surface of the flat rock at each site. The surface of 'crafted rock' and general surface of the surrounding area is having same level. It reveals, that the surface of crafted rocks is not only visible today but it would have been visible during the days or period when rock art was made on themby the ancient men. The status of rock surfaces was more or less same during 'art making days' as they are visible today i.e. depth of the soil was same in this landscape as visible today. During observation, it was noticed that the soil depth is thin which is suitable for the development of grassland.

The grasslands of Aravallis are mainly *Dichanthium* - *Sehima* types i.e. D-S grassland (Dabadghao and Shankarnarayan, 1973; Sharma, 2020). Grasslands of study site are rich in *Dichanthium annulatum, Sehima nervosum, Heteropogon contortus, Eremopogon foveolatus (Dichanthium foveolatum* and *Chrysopogon fulvus. Themeda quadrivalvis, Cymbopogon martini, Eulalia trispicata, Eragrostiella bifaria, Bothriochloa pertusa, Digitaria adscendens, Brachiaria ramosa, Chloris virgata, C. dolichostachya* and *Aristida adscencionis* are other grass species which are seen growing mixed in different composition. The composition indicates that the grassland of Jhalo-Ka-Kalwana is a D-S type grassland.

The 'crafted rocks' are present towards the top or near the top of the piedmonts. Upper area of a piedmont or a hill is more prone to soil erosion than the bottom zone. Therefore, shallow soil exists towards upper reaches and deeper soil layers are seen towards foothill area due to year after year accumulation. Due to less soil depth and more runoff, small height grasses are seen towards the top zone while tall grasses are seen towards the bottom area. It means more visibility remains at top zone in comparison to the bottom area. Rock surface remains exposed towards top zone but same is not found towards the bottom area of a piedmont or a hill. It indicates that crafted surface of all rocks was visible during the period when the art would have been made. Even grasses were of low height during the prehistoric period.

During the early time, three wild animal species namely, tiger (*Panthera tigris*), Indian leopard (*P. pardus*) and sloth bear (*Melursus ursinus*) were common in the area. Last two species are still present in Jarga hills and close to Kumbhalgarh area. Tiger exterminated recently between 1964 – 1970 from this landscape (Singh and Reddy, 2016). Carving of pug marks of sloth bear at location no.1 indicates that prehistoric humans were aware about the threat of wild animals. Elevated sites with grassy vegetation (where visibility was better) were safer than dense forest from the attack of the wild animals. It again indicates that dense forest of low visibility was not present on the piedmonts of Jhalo-Ka-Kalwana but grassy vegetation with good visibility existed during those days.

This interpretation gives a clue that like 'grasslands of Jhalo - Ka - Kalwana' many other grasslands of Gougonda tehsil would have been in 'grassland stage' only during prehistoric period and many of them are not a result of destruction or degradation of the primary forests.

The river Banas is located nearly one kilometer away from the study site. Few years back,

this river was perennial in nature. It is still perennial in the foothills of the Jarga hills. Due to presence of three important natural resources namely, perennial source of water, good forest cover and extensive grasslands, this area would have been selected by the ancient men to live and settle down. The prehistoric rock art near Jhalo-Ka-Kalwana is a relic of one of the anthropogenic activities of the ancient men which is indicating their relationship with grasslands.

AGE OF CUP MARKS

Cupules are present at many places in the Aravallis. They are present in the hills of Shilakhadi village of Faridabad district in Haryana. This site is situated in northern Aravallis. Jhalo - Ka - Kalwana (Gogunda tehsil), where cupules are seen, is situated in southern Aravallis. A good knowledge of cupules can be had from Abbas (2014), Bednarik (2001), Pandey et al. (2024) and Shaik (2014 a and b). Exact age of cupules of Jhalo - Ka - Kalwana is not known. It appears that the age of grassland community of Jhalo - Ka - Kalwana is as old as the cup marks of this area are! In India, the earliest manifestation of cupules has been reported from the Auditorium cave of Bhimbetka which is dated back to 29,000 years ago (29,000 BP) (Bednarik, 2001). It is learnt that, the cupules of Jhalo - Ka - Kalwana date back to 10,000 to 20,000 years ago (Late Prof. Lalit Pandey, personal interaction, 2024; Prof. Vinod Agrawal, pers. com. January 5, 2025). Further studies are invited to establish the exact age of the cupules of Jhalo - Ka - Kalwana. Present study indicated that Jhalo - Ka - Kalwana grasslands, present on the piedmonts of the landscape may be formed dated back to 10,000 years or more.

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