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Discovering Thoughts, Inventing Future

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Estimation of Body Weight of Nigerian Local Turkeys from Zoometrical Measurements at 4, 8 and 12 Weeks of Age

By S.O. Durosaro, M.S. Oyetade, B.M. Ilori, A.S. Adenaike, O. Olowofeso, M. Wheto, S.A. Amusan, S.O. Osho & M.O. Ozoje

Federal University of Agriculture

Abstract - In Nigerian markets, birds are sold on face value and not by actual body weight which prompted this experiment. This experiment was conducted to predict body weight from zoometrical measurements (body length, breast girth and keel length) in Nigerian local turkeys at different ages. A total of 250 poults were used for the study which lasted for 12 weeks. Measurements of body length, breast girth and keel length were regressed against body weight using linear, quadratic and cubic functions. The coefficient of determination (R^2) obtained varied from 24.62% to 81.93% for the three functions. Cubic function had the highest R^2 values for all the zoometrical measurements, while linear function had the least R^2 values in all the three age groups. The highest R^2 value (81.93%) was obtained at the 8th week. Best accuracy of prediction was obtained with breast girth in all the age groups. From the results obtained in this study, body weight of turkeys can be predicted from any of the body length, keel length and breast girth with best accuracy of prediction obtained with cubic function and breast girth as the regressor.

Keywords : body weight, coefficient of determination, regressor, turkeys, zoometrical measurements.

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ESTIMATION OF BODY WEIGHT OF NIGERIAN LOCAL TURKEYS FROM ZOOMETRICAL MEASUREMENTS AT 4, 8 AND 12 WEEKS OF AGE

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Estimation of Body Weight of Nigerian Local Turkeys from Zoometrical Measurements at 4, 8 and 12 Weeks of Age

S.O. Durosaro [α], M.S. Oyetade [σ], B.M. Ilori [ρ], A.S. Adenaike [ω], O. Olowofeso [¥], M. Wheto [§], S.A. Amusan [χ], S.O. Osho [Θ] & M.O. Ozoje [ν]

Abstract - In Nigerian markets, birds are sold on face value and not by actual body weight which prompted this experiment. This experiment was conducted to predict body weight from zoometrical measurements (body length, breast girth and keel length) in Nigerian local turkeys at different ages. A total of 250 poults were used for the study which lasted for 12 weeks. Measurements of body length, breast girth and keel length were regressed against body weight using linear, quadratic and cubic functions. The coefficient of determination (R^2) obtained varied from 24.62% to 81.93% for the three functions. Cubic function had the highest R^2 values for all the zoometrical measurements, while linear function had the least R^2 values in all the three age groups. The highest R^2 value (81.93%) was obtained at the 8th week. Best accuracy of prediction was obtained with breast girth in all the age groups. From the results obtained in this study, body weight of turkeys can be predicted from any of the body length, keel length and breast girth with best accuracy of prediction obtained with cubic function and breast girth as the regressor.

Keywords : body weight, coefficient of determination, regressor, turkeys, zoometrical measurements.

I. Introduction

The main purpose of animal breeding practices is to improve traits of economic value (Mendes *et al.,* 2005) and body weight is one of those important economic traits in the selection of animals. Body weight and body dimensions have been used as parameters for selection by local sellers and for research (Fitzhurgh, 1976; Olowofeso, 2009). Growth traits are useful to livestock farmers and particularly geneticists in improving the market quality of breeding stocks (Nwachukwu *et al.,* 2011).

Traits of economic importance have close association with explanatory variables such as age, breed and morphological characters (Yakubu *et al.,* 2005). Linear equation is usually used to estimate growth in livestock, however, as the growth of individual varies with time and age, the estimation of body weight at different ages are mostly non-linear (Banerjee, 2011).

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Also, breeders need to establish relationships that exist between body weight and zoometrical measurements to organise the breeding programme in order to achieve an optimum combination of body weight and good conformation for efficient production and maximum economic returns (Adeleke *et al.,* 2004). Alternative body measurements and indices estimated from various combinations of conventional and non-conventional body parameters provide superior guide to body weight and are also used as indicators of type and function in domestic animals (Schwabe and Hall, 1989).

Zoometrical measurements have been used in animals to estimate body weight (Topal and Macit, 2004; Yakubu *et al.*, 2005), especially in rural communities where scales are not readily available (Yakubu, 2010). The easiest way to assess an animal's body mass is to weigh the animal but there are no weighing scales in poultry markets and/or villages (Semakula *et al.,* 2011). In Nigerian markets where the marketing system is generally informal and haphazard (Emuron *et al.,* 2010), birds are sold on face value and not by actual body weight. The objective of this study was to develop some simple prediction models for precise estimation of the body weight of Nigerian local turkeys using some zoometrical measurements.

II. Materials and Methods

a) Experimental Site

The experiment was carried out at the Turkey Breeding Unit of the Teaching and Research Farm of the Department of Animal Breeding and Genetics, Federal University of Agriculture, Abeokuta, Alabata, Ogun State Nigeria. Alabata (latitude $7^0 1^0$'N and longitude $3^0$2'E) is in Odeda Local Government Area of Ogun State, Nigeria.

The area which lies in the South Western part of Nigeria has a prevailing tropical climate with a mean annual rainfall of about 1037mm. The mean ambient temperature ranges from 28°C in December to 36°C in February with a yearly average humidity of about 82%. The vegetation represents an interphase between the tropical rainforest and the derived savannah (Ilori *et al.,*

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2010). This study was carried out between February and May 2012.

b) Source, sample size and management of experimental birds

The experimental birds were generated from mating of parent stocks through artificial insemination. 250 poults were used for the experiment which lasted for 12 weeks. The poults were brooded in deep litter pens and all poults were wing-tagged for proper identification and subjected to the same management practices throughout the experimental period of 12 weeks. Commercial feeds and clean water were provided for the birds *ad libitum*. Starter mash containing 28% crude protein and grower mash containing 24% crude protein were fed to the birds from 0-6 and 7-12 weeks of age respectively. Vaccination schedule for turkey was strictly adhered to and adequate sanitation was practised to prevent occurrence of diseases.

c) Data Collection

Traits measured were:

Body weight (BW): Weight of the live bird when placed on measuring balance.

Body length (BL): Length of the body from the base of the snood to the base of the tail around the uropygial gland.

Keel length (KL): Length of the metasternum.

Breast girth (BG): Region of the largest breast expansion when the bird was positioned ventrally.

The zoometrical parameters (body length, keel length and breast girth) were measured in centimeters with tailor's tape rule while the body weight was measured using a balance of 0.05 sensitivity in grammes.

d) Statistical Analysis

Measurements of the zoometrical variables (body length, keel length and breast girth) were regressed against body weight using PROC REG of SAS (1999).

The equations used are depicted as:

$$Y_1 = b_0 + b_1 x + e_1 \text{ .....Linear function}$$

$$Y_2 = b_0 + b_1 x + b_2 x^2 + e_1 \text{ .....Quadratic function}$$

$$Y_3 = b_0 + b_1 x + b_2 x^2 + b_3 x^3 + e_1 \text{ .....Cubic function}$$

Where: Y_1, Y_2, Y_3 are dependent variables (body weights) for each of the functions, x represents the independent variables (body length, keel length and breast girth), b_0 is the intercept, b_1, b_2, b_3 are regression coefficients associated with independent variables and e_1 is the random residual error. The experimental design and the model of the present study were as reported elsewhere by Ilori *et al.* (2010).

III. Results and Discussion

Tables 1, 2 and 3 show the equations, estimates of parameters and coefficient of determination (R^2) for the fitted functions at 4th, 8th and 12th week of age respectively. The R^2 varied from 24.62% to 81.93% for the three functions. The value of R^2 obtained in this study was lower than the R^2 values reported by Adeleke *et al.* (2004) and Amao *et al.* (2011), respectively. Adeleke *et al.* (2004) reported R^2 range of 73.91% to 97.91%; while in a similar study by Amao *et al.* (2011), R^2 ranged from 82% to 92%. The differences between R^2 obtained in this study and that of earlier researchers might be attributed to differences in type of species and types of functions used. Adeleke *et al.* (2004) used exponential and double-log functions. Exponential function was not appropriate in this study because Nigerian local turkeys cannot experience exponential growth in the first 12 weeks of life. Cubic function had the highest R^2 values for all the zoometrical measurements (regressors), while linear function had the least R^2 value across the three age groups.

Coefficient of determination is the percentage of variation in the value of dependent variable (y) that can be explained by variations in the value of the independent variable (x) (Mason *et al.,* 1983; Congelosi *et al.*, 1983). Coefficient of determination is the goodness of fit of a regression and the higher the value, the better the variance that the dependent variable is explained by the independent variable. Coefficient of determination technique is a more conservative measure of the relationship between two variables and often preferred by statisticians (Richard, 1990). The magnitude of the coefficient of determination for each zoometrical measurement in the regression equations showed the relative contribution of each zoometrical measurement to the body weight. The possibility of prediction of body weight from zoometrical measurements in turkeys obtained in this study corroborated the findings of Adeniji and Ayorinde (1990), that body weight of birds can easily be predicted from any given value of the zoometrical measurements (body length, body girth, keel length, shank length, drumstick length and shank thickness) in the Cobb broiler strain using linear and stepwise regression equations. The highest R^2 values obtained in the cubic function implies that the relationships between body weight and body length, keel length and breast girth were best described by cubic function. Also, the highest R^2 value (81.93%) obtained at 8th week suggests that body weight can best be predicted at 8th week of life in turkeys. Best accuracy of prediction was obtained with breast girth in all the three age groups and this is in agreement with the findings of Adeleke *et al.* (2004) who reported the same trend in closely related species-chicken. In the contrary, this trend is in disagreement with the report of Amao *et al.* (2011) who obtained the best accuracy of prediction with keel length.

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Table 1 : Estimate of parameters in linear, quadratic and cubic functions fitted for body weight-zoometrical measurements relationship at 4th week

Zoometrical measurements	Functions	S.E.	R^2	Sig
BL	$Y_1 = -364.81 + 42.89x$	2.32	70.19	***
	$Y_2 = 501.31 - 63.44x + 3.22x^2$	0.91	72.57	***
	$Y_3 = 2225.03 - 382.92x + 22.73x^2 + 0.39x^3$	0.34	72.82	ns
BG	$Y_1 = -448.12 + 45.49x$	2.06	77.07	***
	$Y_2 = 399.74 - 50.53x + 2.69x^2$	0.79	78.79	***
	$Y_3 = 2107.57 - 34x + 18.86x^2 - 0.29x^3$	0.32	78.92	ns
KL	$Y_1 = -232.51 + 105.23x$	7.71	56.24	***
	$Y_2 = -77.32 + 48.32x + 5.14x^2$	6.95	56.54	ns
	$Y_3 = 2939.69 - 1580.05x + 292.71x^2 - 16.61x^3$	5.3	59.21	*

Table 2 : Estimate of parameters in linear, quadratic and cubic functions fitted for body weight-zoometrical measurements relationship at 8th week

Zoometrical measurements	Functions	S.E	R^2	Sig
BL	$Y_1 = -619.31 + 66.10x$	10.56	24.62	***
	$Y_2 = 991.61 - 57.53x + 2.36x^2$	3.59	24.89	ns
	$Y_3 = 19311 - 2149.55x + 80.29x^2 - 0.95x^3$	0.20	81.93	***
BG	$Y_1 = -1178.06 + 86.71x$	4.29	77.29	***
	$Y_2 = 660.02 - 49.04x + 2.47x^2$	0.91	78.61	*
	$Y_3 = 19311 - 2149.55x + 80.29x^2 - 0.95x^3$	0.20	81.93	***
KL	$Y_1 = -942.15 + 241.51x$	18.14	59.64	***
	$Y_2 = 1850.13 - 412.79x + 37.86x^2$	12.03	62.74	*
	$Y_3 = 12657 - 4299.41x + 497.44x^2 - 17.86x^3$	7.48	64.46	*

Table 3 : Estimate of parameters in linear, quadratic and cubic functions fitted for body weight zoometrical measurements relationship at 12th week

Zoometrical measurements	Functions	S.E	R^2	Sig
BL	$Y_1 = -2325.37 + 129.04x$	15.52	36.36	***
	$Y_2 = 12472 - 758.03x + 14.06x^2$	5.12	40.10	*
	$Y_3 = 2424.25 + 135.37x - 14.49x^2 + 0.29x^3$	1.75	40.11	ns
BG	$Y_1 = -1610.46 + 105.62x$	6.61	68.54	***
	$Y_2 = 6733.64 - 394.71x + 7.43x^2$	1.40	74.53	***
	$Y_3 = 8969.05 - 596.71x + 13.46x^2 - 0.06x^3$	0.42	74.53	ns
KL	$Y_1 = -1668.93 + 332.17x$	19.70	70.14	***
	$Y_2 = 4124.76 - 730.68x + 48.24x^2$	15.19	72.46	***
	$Y_3 = 16894 - 4243.33x + 367.96x^2 - 9.63x^3$	12.83	72.59	ns

****P<0.001, *P<0.05, ns = Not significant.*

Y_1, Y_2 and Y_3 = Body weight (g), BL = Body length (cm), BG = Breast girth (cm), KL = Keel length (cm), R^2 = Coefficient of Determination (%), S.E. = Standard error, Sig = Level of significance.

IV. Conclusion

From the results obtained in this study, body weight of turkeys can be predicted from any of the zoometrical measurements/variables; body length, keel length and breast girth with best accuracy of prediction obtained with cubic function and the breast girth been used as the regressor. Cubic function can be used in lieu of other mathematical functions when there is need to predict the body weight of Nigerian local turkeys.

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The Last Three Decades of Stroke Epidemiology in Novi Sad

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Abstract - At the Collaborating Center of the WHO MONICA project in Novi Sad (Capital of Autonomic Province of Vojvodina, Serbia), the research results of Stroke epidemiology during favorable circumstances in our social community show a decrease of the incidence and mortality from stroke, and indicate that prophylactic measures performed during the first.

Ten years were successful at completing of their mission. In the period 1983 – 1992 morbidity and mortality from stroke dropped by about 20%. The main activities dealt with recording the incidence and mortality of stroke and analysis of population samples during intervention program. The results of Stroke epidemiology since 1993 and later show that with the war in the neighboring countries decrease of general life standard of population. Large social, medical and economic sanctions imposed by United Nations, the previous favorable results, this beneficial trend have reversed and rates have increased continually. All results are undergoing the final analyses and tests of hypotheses, and they are published in the most reputable world medical journals. Unfortunately, the main risk factors in population age 20 years and over in the first decade of XXI century in Autonomic Province of Vojvodina are still physical inactivity, hypertension, smoking, overweight, and obesity, the same that were at the beginning of the WHO MONICA program, at the end of XX century in Novi Sad.

Keywords : stroke, epidemiology, WHO MONICO project.

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THE LAST THREE DECADES OF STROKE EPIDEMIOLOGY IN NOVI SAD

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I. Introduction

Episodes of stroke and familial stroke occurrence have been reported as early as 2700 years ago in ancient Mesopotamia and Persia (1). During this very long history stroke events and today represent one of the main cause of disabilities and deaths over the world. Changing concepts of the etiology, diagnosis, and treatment of stroke syndromes in the past more than 60 years have been responsible for a widespread renewal of interest in this disease, and we have identified major risk factors (RF) for the disease and have developed stroke management from the primary prevention to the treatment in the acute phase, secundary prevention and medical rehabilitation of stroke (2).

The MONICA (Multinational MONItoring of trends and determinants in CArdiovascular disease) Project was established in the early 1980s by the World Health Organization (WHO) Working Group in many centers around the world. It was set up to explain the diverse trends in cardio and cerebrovascular disease (CVD) mortality which were observed from the 1970s onwards. Specifically the programmed focuses on trends in event rates for validated fatal and non-fatal coronary heart attacks and strokes, and on trends in CVD and stroke risk factors (blood pressure, cigarette smoking and serum cholesterol) in men and women aged 25-64 in the same defined communities. By this means it is hoped both to measure changes in CVD and stroke mortality and to see how far they are explained; on the one hand by changes in incidence mediated by risk factor levels; and on the other by changes in case-fatality rates, related to medical care. Population centers need to be large and numerous; to reliably establish 10-year trends in event rates within a centre 200 or more fatal events in men per year are needed, while for the collaborative study a multiplicity of internally homogeneous centers showing differing trends will provide the best test of the hypotheses. At the beginning were 41 MONICA Collaborating Centers, using a standardized protocol, are studying 118 Reporting Units (subpopulations) with a total population aged 25-64 (both sexes) of about 15 million. Finally, there were total of 32 MONICA Collaborating Centers in 21 countries which successful finish all of anticipated investigation. The total population age 25-64 years monitored was ten million men and women. The ten year data collection was completed in the late 1990s, and the main resWere published in the following years. The data are still being used for analysis (3, 4).

II. The Who Monica Collaborating Center in Novi Sad (Mcc ns) (Yugnos 49)

MCC NS was one of the participants in WHO MONICA Project, and was the only MONICA population in former Yugoslavia. Citizens aged 25-64 of the city of Novi Sad, a multiethnic and multicultural society of some 20 nationalities. There were several hospitals, a medical centre and a university medical school. Mortality from stroke was the highest in the country. Response to population surveys was very good. Health service of Novi Sad successfully passed the strict criteria, and was highly estimated for its research. The first MONICA survey determined the levels and distribution of major RF, contributing to preventive work on coronary disease and stroke (6).

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Following the 1982 WHO report on the regional differences in standardized stroke mortality rates in Socialistic Federal Republic (SFR) Yugoslavia which was unfavorable for the population in Autonomic Province of Vojvodina, Novi Sad, and the Health Service started doing research within the MONICA Project. The study was instigated in 1983 and was supposed to last 10 years. During the conduction of the study our country fell apart, due to participation in war operations in surrounding countries, it was isolated from the international community and it suffered UN sanctions. Because of this Novi Sad MONICA center extended its work after the study has reached its end and Project lasted until 2005. Novi Sad MCC was a unique link between our country and international communities during the isolation and sanction period from 1992 to 1996 and from 1998 to 2001 (5, 6).

Aim of the study was to measure the trends of the stroke morbidity and mortality, as well as the evaluation of their connection with the changes in main RF, life styles, development of the health service and socio economic characteristics measured simultaneously in defined populations (6).

Data was gathered on ischemic stroke for the population of 25- 64 years of age, also collected was data on the presence of RF obtained from the examination of the population representative sample 1984, 1988 and 1994 (Table1, 2 and 3) (5, 6).

Table 1 : Distribution of risk factors for the sample of Novi Sad inhabitants 1984

MONICA 1984	N	%
HYPERTENSION (21.3/12/7 kpa plus)	408	25.80
HYPERCHOLESTEROLEMIA(6.7mmol/lplus)	214	13.50
HYPERGLYCEMIA (5.6 mmol/l plus)	53	5.10
SMOKING (5 cigarettes plus)	625	39.50
OBESITY (27.0 plus)	688	43.50
DAILY DRINKING	137	8.60

Table 2 : Distribution of risk factors for the sample of Novi Sad inhabitants 1988

MONICA 1988	N	%	MEAN	VAR	CD	CV
HYPERTENSION (N=1556)	422	27.00	17.97	6.72	2.60	14.46
HYPERCHOLESTEROL (N=1556)	614	39.13	6.20	1.68	1.30	20.94
HYPERGLYCEMIA (N=1270)	324	20.65	5.17	2.62	1.63	31.52
SMOKING (N=1556)	654	41.70	20.43	132.70	11.53	56.42
OBESITY (N=1556)	698	44.50	26.76	20.20	4.50	16.81

Table 3 : Distribution of risk factors for the sample of Novi Sad inhabitants 1994

MONICA 1994	N	%	MEAN	VAR	CD	CV
HYPERTENSION (N=1554)	519	33.40	17.89	8.98	3.00	16.75
HYPERCHOLESTEROL (N=1270)	461	36.30	6.12	1.69	1.30	21.25
HYPERGLYCEMIA (N=1270)	342	26.93	5.54	4.71	2.18	39.33
SMOKING (N=1554)	655	42.14	21.48	88.72	9.42	17.88
OBESITY (N=1270)	586	46.14	26.94	23.18	4.82	16.81
DAILY DRINKING(N=1554)	204	13.13	-	-	-	-

After the diagnostic categorization was performed using an algorithm in accordance to MONICA protocol, event registration was done (Table 4 and 5) (6).

During the period from 1983 to 2005 in general population were registered 10.874 stroke events: male 52% and female 48%. Mortality rate during 28 days was 53, 3%. At the end of the first ten years incidence rate decrease to 15, 3 %, and at the end of the study it's increase for 53%. Mortality rates at the first period decreased to 48%, and at the end of the study increase for 21 % (Table 4).

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Table 4

R.B.	GODINA	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2003	2004	2005	SVEGA
1	Dk=1 nefatalno	191	203	186	254	241	202	257	235	217	200	219	252	302	320	313	309	213	295	343	317	5,069
2	Dk=4 nefatalno	0	0	0	0	0	0	0	6	0	0	0	0	0	0	1	0	0	1	1	0	9
3	Dk=5 nefatalno	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	2	7
4	Dk=9 nefatalno	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	6	0	0	0	10
1-4	NEFATALNO	191	203	186	254	241	202	257	241	217	200	219	252	302	320	315	313	219	297	347	319	5,095
5	Dk=1 fatalno	269	289	263	226	268	239	216	170	229	219	275	300	323	348	346	376	263	355	322	366	5,662
6	Dk=4 fatalno	5	10	4	1	5	4	5	11	6	7	5	0	4	3	9	2	0	1	1	0	83
7	Dk=5 fatalno	3	1	0	1	4	1	3	1	2	1	1	1	4	3	2	1	0	3	5	4	41
8	Dk=9 fatalno	51	16	0	4	1	1	2	2	0	1	1	1	0	0	2	2	1	0	0	0	85
5-8	FATALNO	328	316	267	232	278	245	226	184	237	228	282	302	331	354	359	381	264	359	328	370	5,871
1-8	SVEGA	519	519	453	486	519	447	483	425	454	428	501	554	633	674	674	694	483	656	675	689	10,966
	Dk1NF+Dk1F+Dk5F +Dk9F	514	509	449	485	514	443	478	408	448	421	496	554	629	671	663	688	477	653	670	687	10,857
	SVEGA (bez Dk4NF i DK4F)	514	509	449	485	514	443	478	408	448	421	496	554	629	671	664	692	483	654	673	689	10,874
	DK1F,DK5F,DK9F	323	306	263	231	273	241	221	173	231	221	277	302	327	351	350	379	264	358	327	370	5788
	DK1F,DK5F,DK9F/ DK1NF,DK1F,DK5F, DK9F	62.8%	60.1%	58.6%	47.6%	53.1%	54.4%	46.2%	42.4%	51.6%	52.5%	55.8%	54.5%	52.0%	52.3%	52.8%	55.1%	55.3%	54.8%	48.8%	53.9%	53.3%

In MONICA population registered were 3324 stroke events: 30, 6 % from all of stroke events in general populations. At the end of the study the incidence rate was for 10 % higher. Mortality rate at the first ten years was decrease for 20 %. At the end of the study mortality rate for 33, 5% increase (Table 5).

Table 5

R.B.	GODINA	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2003	2004	2005	SVEGA
1	Dk=1 nefatalno	89	112	112	142	128	110	132	110	112	106	121	107	149	138	124	138	77	136	120	132	2,395
2	Dk=4 nefatalno	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	4
3	Dk=5 nefatalno	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
4	Dk=9 nefatalno	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	5
1-4	NEFATALNO	89	112	112	142	128	110	132	113	112	106	121	107	149	138	124	139	81	137	121	133	2,406
5	Dk=1 fatalno	66	54	81	58	72	95	92	57	74	69	72	90	94	81	97	85	48	77	132	129	1,623
6	Dk=4 fatalno	5	10	4	1	3	1	5	6	3	3	1	0	1	2	5	0	0	0	2	0	52
7	Dk=5 fatalno	3	1	0	1	1	1	2	1	0	0	0	1	3	1	0	1	0	3	0	1	20
8	Dk=9 fatalno	4	0	0	1	0	0	1	0	0	0	1	1	0	0	1	2	0	0	0	0	11
5-8	FATALNO	78	65	85	61	76	97	100	64	77	72	74	92	98	84	103	88	48	80	134	130	1,706
1-8	SVEGA	167	177	197	203	204	207	232	177	189	178	195	199	247	222	227	227	129	217	255	263	4,112
	Dk1NF+Dk1F+Dk5F +Dk9F	162	167	193	202	201	206	227	168	186	175	194	199	246	220	222	226	125	216	252	262	3,319
	SVEGA(bez Dk4NF i DK4F)	162	167	193	202	201	206	227	168	186	175	194	199	246	220	222	227	129	217	252	263	3,324
	DK1F,DK5F,DK9F	73	55	81	60	73	96	95	58	74	69	73	92	97	82	98	88	48	80	132	130	1654
	DK1F,DK5F,DK9F/ DK1NF,DK1F,DK5F, DK9F	45.1%	32.9%	42.0%	29.7%	36.3%	46.6%	41.9%	34.5%	39.8%	39.4%	37.6%	46.2%	39.4%	37.3%	44.1%	38.9%	38.4%	37.0%	52.4%	49.6%	49.8%

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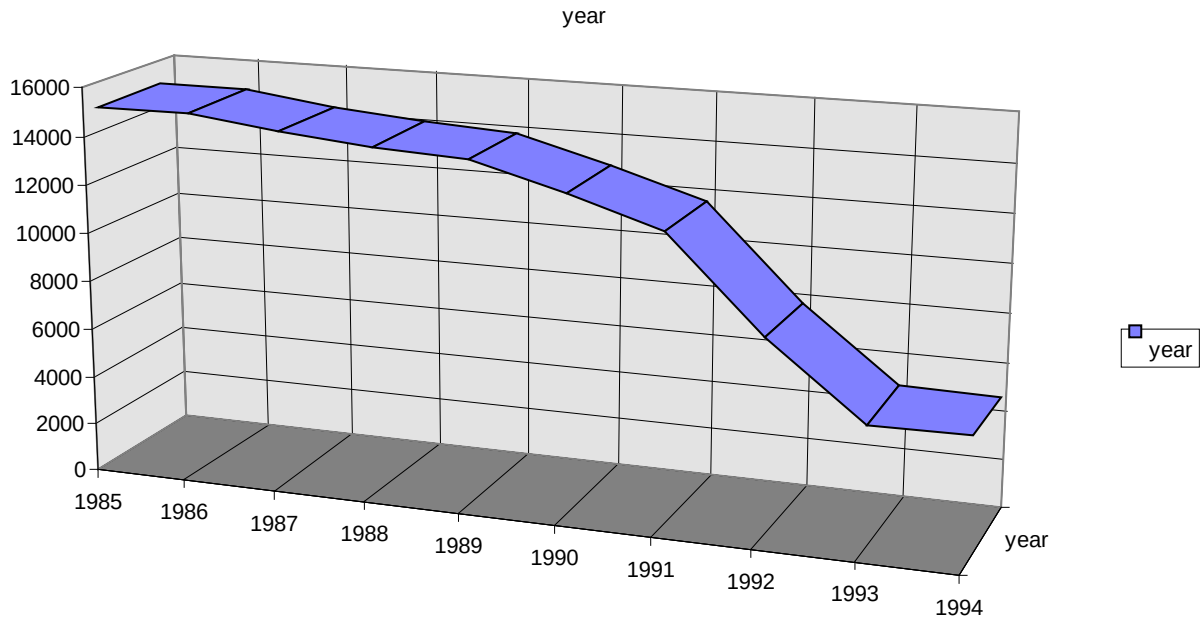
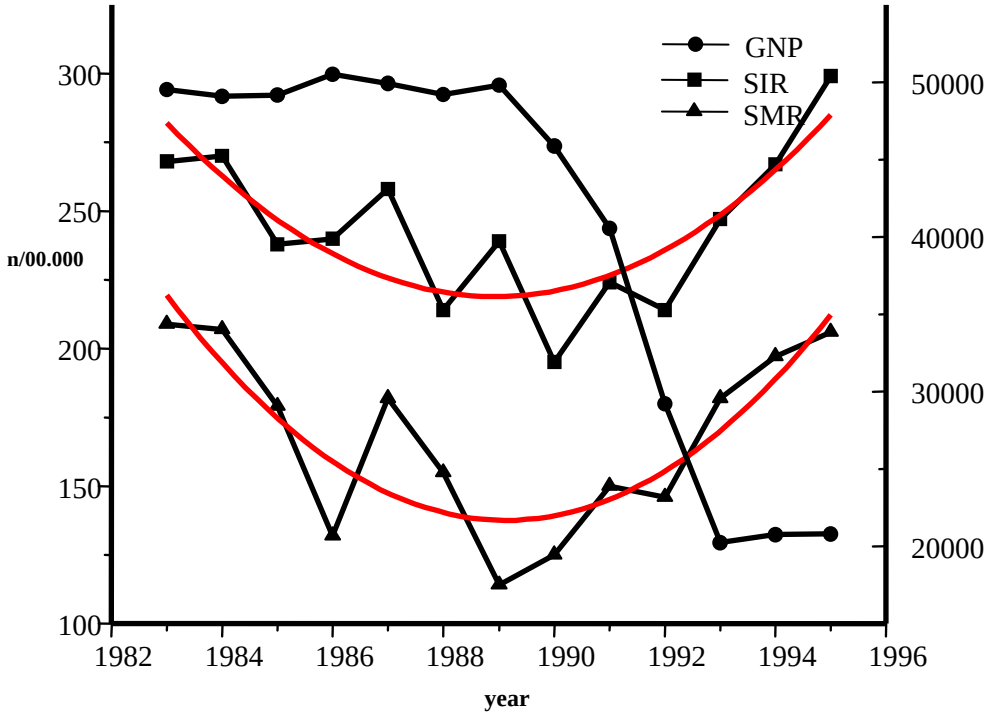
Figure 1 : Gross National Product (GNP) in Autonomic Province of Vojvodina from 1985 to 1994 (in YUD milliard)



After destroyed of former SFRY, from 1992 to 1995 in the new sociopolitical community named Socialistic Republic of Yugoslavia (SRY) established the higher economic crisis and monetary inflations in modern human history, because introducing of the UN sanctions in all part of life and work.

Considering the significant differences in the movement of incidence and lethality in the study period from 1983-1992 and after that up to 2005, the results were separately analyzed. In the first period incidence was 12% lower and the mortality rate 21% lower on the annual level. During the duration of the UN sanctions (1992-1995) ischemic stroke incidence was increased 26,6%, and lethality 2,7%, and at the end of the second period the incidence was higher for 30% and lethality for 33,5%.

Figure 2 : Relation between Gross National Product (GNP), incidence (SIR) and mortalit (SMR) stroke rates from 1983 to 1995



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In the period 1983 – 1990 morbidity and mortality from stroke fell by about 20%. Since 1991, and especially from 1992, with war circumstances and economic sanctions, this beneficial trend has reversed and rates have increased continually (6). The circumstances in which the prophylactic project for ischemic stroke is conducted directly proportionately affect the results gained.

The research results of MCC NS are undergoing the final analyses and tests of hypotheses, and they are published in the most reputable world journals (7). The main activities dealt with recording the incidence of stroke, analysis of population samples and carrying out intervention program. During favorable social, political and economic circumstances, the results of decreased of the incidence and mortality from stroke indicate that take of prophylactic measures at the first period 1983 - 1992 were successful completion of a mission (8, 9, 10).

Methodological questions connected with choosing and applying a sampling method for monitoring CVD in multinational, multicentric WHO MONICA project, the sample which was used for periodical assessment of changes in RF levels were very carefully collected and finally analyzed, and mandatory data collection about the RF's in the city area of Novi Sad, transferred to Data Centre in Helsinki, became a part of an international open-source database (11).

Despite this, the main RF in population aged 20 years and over still in 2006 in Autonomic Province of Vojvodina are physical inactivity (65,4 %), hypertension (46,1 %), smoking (37,5 %), overweight (35,2 %), and obese (20,5 %). About 7 % of adults who drink alcohol are in the group with moderate risk for development of chronic disease, while 3,7 % are heavy drinkers. Such situation requires integrated strategic approach supported with policy, capacity building, surveillance and dissemination (12).

III. Conclusion

During favorable circumstances, the results of decreased of the incidence and mortality from coronary and cerebrovascular disease, indicate that take of prophylactic measures during the first ten years period were successful completion of a mission. (9, 10)

Multicentric, multinational and scientific research WHO MONICA Project, apart from having large scope and large statistical background, also has a great scientific influence measured by about 6000 citation at the base of Web of Science Citations Index (13).

Without prophylactic measurements it is not possible to give favorable results in this very complex health fields, and actually the main risk factors in population age 20 and over, still in 2006 in Autonomic Province of Vojvodina, are the same as they were at the beginning of the WHO MONICA project before 25 years. Such situation requires integrated strategic approach supported with policy, capacity building, surveillance and dissemination (12).

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Short Communication. Characterization of the Reli Almuñécar Grapevine Cultivar

By A. Jiménez-Cantizano, M. Lara, M.E. Ocete & R. Ocete
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Abstract - A prospection of Andalusian Mediterranean vineyards was carried out in search of the traditional Almuñécar grapevine, used to produce raisins of quality. An ampelographical description and a genetic characterization, using 20 nuclear microsatellite *loci*, showed that this cultivar constitutes a clone of Muscat of Alexandria. In reference to biotic stress, this cultivar has a high sensibility to powdery and downy mildews and medium sensibility to the grapevine pathogen *Botrytis cinerea*. At the present time, it constitutes a relic cultivar due to different sanitary and economical causes analyzed in the text.

Keywords : ampelography; Muscat of Alexandria; nuclear microsatellite; raisin.

GJSFR-G Classification : FOR Code: 070304, 270299

SHORT COMMUNICATION. CHARACTERIZATION OF THE RELI ALMUNECAR GRAPEVINE CULTIVAR

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Abstract - A prospection of Andalusian Mediterranean vineyards was carried out in search of the traditional Almuñécar grapevine, used to produce raisins of quality. An ampelographical description and a genetic characterization, using 20 nuclear microsatellite *loci*, showed that this cultivar constitutes a clone of Muscat of Alexandria. In reference to biotic stress, this cultivar has a high sensibility to powdery and downy mildews and medium sensibility to the grapevine pathogen *Botrytis cinerea*. At the present time, it constitutes a relic cultivar due to different sanitary and economical causes analyzed in the text.

Additional keywords : ampelography; Muscat of Alexandria; nuclear microsatellite; raisin.

Resumen - Caracterización del relicto cultivar de vid Almuñécar Se ha realizado una prospección del viñedo de la vertiente mediterránea de Andalucía para buscar la variedad tradicional Almuñécar, usada para la producción de pasas de calidad. La descripción ampelográfica y la caracterización genética, empleando 20 *loci* de microsatélites nucleares, han indicado que este vidueño constituye un clon de la variedad Moscatel de Alejandría. Respecto al estrés biótico, esta variedad se muestra muy sensible al oídio y mildiu, así como a *Botrytis cinerea*. En la actualidad, la variedad puede considerarse como relicta, debido a causas económicas y fitosanitarias referidas en el texto.

Palabras clave adicionales : ampelografía; moscatel de alejandría; microsatélites nucleares; pasa.

I. Introduction

During the Arab domination of the Iberian Peninsula (from 8th to 15th century AC), vineyards were established in the southern Mediterranean coast to produce table grapes, raisins and alcohol (Gámez, 2004). Majority of this area was placed along the actual provinces of Málaga and Granada (Andalusia, Spain). From that age, the most usual cultivar was Muscat of Alexandria, named earlier Apiana by Plinius (1st century AC). Raisin production (*zebid almonacabi*, in old Spanish Arab documentation) was an important economic support for Almuñécar (Granada) and Málaga (Mármol, 1991; Marín *et al.*, 1992). When this village was conquered by Castillian troops in 1489, there were 17 aranzadas (about 76 ha) of vineyard (Calero, 1984). In the age of the Enlightenment, De Torres (1785) published a book where several practices to optimize the management of the Muscat vineyards in Almuñécar municipality, focused on raisin production, are indicated. García de la Leña (1792) has a reference on the use of that cultivar in Málaga province to produce also a wine mixtured with Pero Ximen must. Clemente y Rubio (1807) indicated the great biodiversity of the Granada coast vineyards, where the main cultivars were "Jaen negro de Granada, Albillo de Granada, Pedro Ximenez Zumbon, Tinto o Tintillo de Luxar, Romé negro, Montúo castellano, Pecho de perdiz, Zurumí, Doradillo or Jaen, Montúo perruno, Pedro Ximenez, Calona negra, Corazón de Cabrito, Casco de tinaja, Ataubí, Jaldona, Teta de negra, Moscatel menudo blanco, Moscatel menudo morado, Moscatel gordo blanco, Vigiriega de Motril, Jamí, Mollar de Granada, Ciutí or Lanxaron". He said about the named Pasa Larga in Almuñécar or Uva de Pasa in Motril, known as Almuñécar in other Andalusia areas: "This kind of raisin is payed double that the others, it is the most famous in Málaga it is dried under a sunny exposure. A great part of Almuñécar economy is based on this product". In 1930, majority of vineyards to produce raisins were situated between Almuñécar and Salobreña towns, from Taramay state to Cambrón gully. Grapes were dried in the open air in special pools made of masonry or on roofs covered, in both cases, by the plant *Genista umbellata* (L' Her) (Vigo *et al.*, 2009).

The existence of synomyns (different names for the same variety) and homonyms (different varieties with the same name) is one of the major problems in the management of germplasm collections. The identification of grape cultivars has traditionally been based on ampelography, which is the analysis and comparison of morphological characters of leaves, shoot tips, fruit clusters and berries (IPGRI-UPOV-OIV, 1997; Galet, 2000). Some genetically related cultivars are morphologically very similar and difficult to differentiate by visual comparison (Aradhya *et al.*, 2003). On the other hand, intravarietal clones can differ considerably in phenotype even though they have virtually identical DNA profiles (Vignani *et al.*, 1996; Riaz *et al.*, 2002). Microsatellite sites are excellent markers for grapevine characterization (Sefc *et al.*, 2001). In general, all plants belonging to the same cultivar (*i.e.*, from a

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monoclonal origin) show identical genotypes in all microsatellite loci (Ibáñez *et al.*, 2009).

The aim of the present paper was to characterize and recuperate the historical relic cultivar Almuñécar for its *ex situ* conservation in the germplasm bank of the IFAPA Centro Rancho de la Merced (Jerez de la Frontera, Cádiz, Spain).

A prospection to find Almuñécar grapevine was carried out from 1996 to 2002 in vineyards located from Estepona (Málaga, Spain) to Motril (Granada, Spain). Five vines with typical ampelographical characteristics of the Almuñécar cultivar, according to the ampelographical description given by Clemente y Rubio (1807), were found around the town of Almuñécar (Granada, Spain). The accessions collected were kept in the collection of the IFAPA Centro Rancho de la Merced germplasm bank (Jerez de la Frontera, Cádiz, Spain).

The plant material for the characterization was obtained from the IFAPA Centro Rancho de la Merced germplasm bank and the plot located at Almuñécar.

Ampelographic data were collected between 2003 and 2007 in the plot located at Almuñécar and 2008 and 2009 in the IFAPA Rancho de la Merced germplasm bank. At the first time, IPGRI, UPOV, OIV (1997) code was used and later descriptors were adapted to OIV code (2009). One hundred and eight descriptors were used, including descriptors relative to young shoots, young leaves, mature leaves, woody shoots, flower, inflorescence, bunches, berries and seeds. Ten readings per each descriptor were taken on five plants. Berry measurements were made at harvest using 50 berries, from 10 bunches.

Data on the phenological stages (Baillod & Baggiolini, 1993) were collected during seven years (2003-2009) in Almuñécar. The index maximum width/maximum length of 50 berries of Almuñécar cultivar was compared with 50 berries of Muscat of Alexandria using one way ANOVA (Massart *et al.*, 1997).

The sensibility to diseases (*Plasmopara viticola, Erysiphe necator* and *Botrytis cinerea*) was observed in the field each year between 2003 and 2009 on the five vines located in Almuñécar using OIV descriptor (OIV, 2009). To evaluate the sensibility to both mildews under standard laboratory conditions, tests using foliar discs, with 20 repetitions of each sample, were also carried out. In the case of the powdery mildew, the method used was the indicated by OIV (2009) and for downy mildew the procedure of Staudt & Kassemeyer (1995) and Rumbolz *et al.* (2002). Foliar discs of Palomino fino cultivar and the 41B rootstock were used as reference in the test.

DNA was extracted from young leaves using DNeasy Plant Mini Kit (Qiagen). A genotypic characterization was performed for 20 nuclear microsatellite *loci* located in the 19 linkage groups of grapevine genome: VMC1b11, VMC4F3-1 (Vitis Microsatellite Consortium); VVMD5, VVMD7, VVMD21, VVMD24, VVMD25, VVMD27, VVMD28, VVMD32 (Bowers *et al.*, 1996, 1999); VVS2 (Thomas & Scott, 1993); VVIB01, VVIH54, VVIN16, VVIN73, VVIP31, VVIP60, VVIQ52, VVIV37, VVIV67 (Merdinoglu *et al.*, 2005). Two multiplex PCR tests were set up to amplify the 20 microsatellite *loci* (Vargas *et al.*, 2007) and amplified with an Applied Biosystems 9700 thermocycler.

Amplified products were separated in capillary electrophoresis using an automated sequencer (ABI Prism 3130, Applied Biosystems). Fluorescently labelled fragments were detected and sized using GeneMapper v. 3.7 software (Applied Biosystems) and fragment lengths were determined with the help of internal size standards (GeneScan-500 LIZTM, Applied Biosystems).

Identification of redundant genotypes was determined by comparing microsatellite genotypes with data contained in the microsatellite grapevine databases IFAPA Centro Rancho de la Merced (in preparation) and the *Vitis* Germplasm Bank at the Finca El Encín (IMIDRA, Alcalá de Henares, Spain) (Ibañez *et al.*, 2009; Vargas *et al.*, 2009). Genotype comparisons were carried out using Microsatellite toolkit v. 9.0 software package (Park, 2001).

The first result to remark is that Almuñécar was a widely cultivated cultivar before phylloxera infestation and at the present time is a very minoritary cultivar along the Mediterranean coast of Andalusia.

In the Axarquía area situated in the Málaga province the main synonymies were: Moscatel Real and Larga. In Granada coast (Spain): Almuñécar, Moscatelón, Moscatelona, Pasa larga, Uva de pasa and Uva de yema. Ampelographical data for the cultivar Almuñécar are shown in Table 1.

In Muscat of Alexandria the averages of the maximum width and length of the berries were 20.64 ± 0.33 mm and 26.86 ± 0.42 mm, respectively. In the case Almuñécar cultivar, 16.48 ± 0.16 mm and 29.1 ± 0.28. The width/length indexes were 0.77± 0.01 and 0.57± 0.01, respectively. The comparison of the analysis of de variance using Anova test indicated there were statistically significative differences between both cultivars ($F= 294.57$; $\alpha=0.05$).

The calendar in shoot developmental stages was: Bud burst, March 15-22; flowering time, May 15-24; veraison, July 15-26; maturation, September 5-15; leaf fall, November 19-27.

Field and laboratory observations indicated that Almuñécar cultivar had a high susceptibility to powdery and downy mildews (Table 1). On the other hand, symptoms caused by *Botrytis cinerea* are very frequent on bunches mainly in October, when the first important dews took place in Almuñécar area.

Table 2 shows the allele profiles obtained for Almuñécar cultivar. The five accessions analyzed presented the same genotype at 20 microsatellite *loci* analyzed. The genotype obtained for Almuñécar cultivar

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was compared with the genotypes database of the germplasm bank at IFAPA Centro Rancho de la Merced (Jiménez-Cantizano, unpublished data). Cultivars Almuñécar and Muscat of Alexandria showed the same genotype combination for the 20 microsatellite *loci*: however, these cultivars had significant morphologic differences in the berries (Figure 1). This could be explained by the occurrence of somatic variants of the same cultivars in several grapevine growing areas (Bowers *et al*., 1996). Varieties are described that differ only in minor characters, such as berry pigmentation or the presence of capillaries in the leaves caused by mutations (sports), as in Garnacha (Cabezas *et al*., 2003), Cariñena, Xarel-lo (Ibáñez *et al*., 2003), or Moscatello (De Mattia *et al*., 2007). Microsatellite analysis cannot resolve these minimal differences that occur between clonal types or sports.

Muscat of Alexandria genotype was compared with the genotype obtained for Ibáñez *et al*. (2009) and Vargas *et al*. (2009), at the same 20 microsatellite *loci*, from plant accessions kept at "El Encín" germplasm collection. We obtained very similar result of microsatellite profile of Muscat of Alexandria. In 12 of the 20 microsatellite *loci* the data for identical alleles differed by 1 bp. The differences showed of the allele sizes obtained by the two different laboratories are the result of the rounding methods (This *et al*., 2004).

Due to phylloxera, infestation, detected between 1880 and 1883 and droughts, several vineyards were abandoned in Almuñécar (Granada). In 1909 about 3,000 people living in the surrounding Almuñécar emigrated to Ledesma (Jujuy province, Argentine). The decline of raisin trading and the introduction of subtropical cultivars in the area and the high susceptibility of the Almuñécar cultivar to powdery and downy mildews reduced more its presence near extinction at present time.

This research has allowed the recovery of this ancient cultivar, that constitute a clone of Muscat of Alexandria, and its preservation in Rancho de la Merced germplasm bank (Jerez de la Frontera, Spain), where it constitutes a material to be used in further studies or for the establishmet of new plantations. Accurate identification of accessions is a basic requirement for the rational management and use of germplam.

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Table 1 : Mean values for the OIV (2009) ampelografic descriptors observed in Almunécar cultivar during seven years (2003-2009)

OIV Code	Descriptor	Expression	Notes
001	Young Shoot: aperture of tip	5	fully open
002	Young Shoot: distribution of anthocyanin coloration on prostrate hairs of tip	2	piping
003	Young Shoot: intensity of anthocyanin coloration on prostrate hairs of tip	5	medium
004	Young Shoot: density of prostrate hairs on tip	5	medium
005	Young Shoot: density of erect hairs on tip	1	none or very low
006	Shoot: attitude (before tying)	1	erect
007	Shoot: colour of dorsal side of internodes	2	green and red
008	Shoot: colour of ventral side of internodes	2	green and red
009	Shoot: colour of dorsal side of nodes	3	red
010	Shoot: colour of ventral side of nodes	3	red
011	Shoot: density of erect hairs on nodes	1	none or very low
012	Shoot: density of erect hairs on internodes	1	none or very low
013	Shoot: density of prostrate hairs on nodes	1	none or very low
014	Shoot: density of prostrate hairs on internodes	3	low
015-2	Shoot: intensity of anthocyanin coloration on bud scales	5	medium
016	Shoot: number of consecutive tendrils	1	2 or less
017	Shoot: length of tendrils	3	short
051	Young leaf: colour of the upper side of blade (4 th leaf)	4	copper-reddish

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053	Young leaf: density of prostrate hairs between main veins on lower side of blade	3	low
054	Young leaf: density of erect hairs between main veins on lower side of blade	1	none or very low
055	Young leaf: density of prostrate hairs on main veins on lower side of blade	3	low
056	Young leaf: density of erect hairs on main veins on lower side of blade (4 th leaf)	1	none or very low
065	Mature leaf: size of blade	5	medium
067	Mature leaf: shape of blade	3	pentagonal
068	Mature leaf: number of lobes	3	five
069	Mature leaf: colour of the upper side of blade	5	medium green
070	Mature leaf: area of anthocyanin coloration of main veins on upper side of blade	3	up to the 1 bifurcate.
071	Mature leaf: area of anthocyanin coloration of main veins on lower side of blade	2	only at the petiolar
072	Mature leaf: goffering of blade	3	weak
073	Mature leaf: undulation of blade between main and lateral veins	1	absent
074	Mature leaf: profile of blade in cross section	5	twisted
075	Mature leaf: blistering of upper side of blade	3	weak
076	Mature leaf: shape of teeth	4	concave-convex
077	Mature leaf: size of teeth in relation to blade size	3	small
078	Mature leaf: length of teeth compared with their width	7	long
079	Mature leaf: degree of opening / overlapping of petiole sinus	5	closed
080	Mature leaf: shape of base of petiole sinus	3	V-shaped
081-1	Mature leaf: teeth in the petiole sinus	1	none
081-2	Mature leaf: petiole sinus base limited by veins	1	not delimited
082	Mature leaf: degree of opening / overlapping of upper lateral sinus	1	open
083-1	Mature leaf: shape of base of upper lateral sinuses	3	V-shaped
083-2	Mature leaf: teeth in the upper lateral sinuses	1	none
084	Mature leaf: density of prostrate hairs between the main veins on lower side of blade	3	low
085	Mature leaf: density of erect hairs between the main veins on lower side of blade	1	none or very low
086	Mature leaf: density of prostrate hairs on main veins on lower side of blade	3	low
087	Mature leaf: density of erect hairs on main veins on lower side of blade	1	none or very low
088	Mature leaf: prostrate hairs on main veins on upper side of blade	1	absent

Table 1 : Continuation

OIV Code	Descriptor	Expression	Notes
089	Mature leaf: erect hairs on main veins on upper side of blade	1	absent
090	Mature leaf: density of prostrate hairs on petiole	3	low
091	Mature leaf: density of erect hairs on petiole	1	none or very low
093	Mature leaf: length of petiole compared to length of middle vein	3	slightly shorter
094	Mature leaf: depth of upper lateral sinuses	5	medium
101	Woody shoot: cross section	2	elliptical
102	Woody shoot: structure of surface	3	striate
103	Woody shoot: main colour	2	brownish
104	Woody shoot: lenticels	1	absent
105	Woody shoot: erect hairs on nodes	1	absent
106	Woody shoot: erect hairs on internodes	1	absent
151	Flower: sexual organs	3	

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152	Inflorescence: insertion of 1st inflorescence	2	3 and 4 node
153	Inflorescence: number of inflorescences per shoot	2	1,1 to 2
155	Shoot: fertility of basal buds (buds 1-3)	5	medium
202	Bunch: length (peduncle excluded)	7	long
203	Bunch: width	5	medium
204	Bunch: density	3	loose
206	Bunch: length of peduncle of primary bunch	3	short
207	Bunch: lignification of peduncle	1	at the base only
208	Bunch: shape	1	cylindrical
209	Bunch: number of wings of the primary bunch	2	1-2 wings
220	Berry: length	9	very long
221	Berry: width	5	medium
222	Berry: uniformity of size	1	not uniform
223	Berry: shape	4	narrow ellipsoid
225	Berry: colour of skin	1	green yellow
226	Berry: uniformity of colour of skin	1	not uniform
227	Berry: bloom	5	medium
228	Berry: thickness of skin	7	thick
229	Berry: hilum	2	visible
231	Berry: intensity of the anthocyanin coloration of flesh	1	none or very weak
232	Berry: juiciness of flesh	2	medium juicy
233	Berry: must yield	7	high
235	Berry: firmness of flesh	2	slightly firm
236	Berry: particularity of flavour	2	muscat
238	Berry: length of pedicel	3	short
240	Berry: ease of detachment from pedicel	3	difficult
241	Berry: formation of seeds	1	complete
242	Berry: length of seeds	7	long
243	Berry: weight of seeds	5	medium
244	Berry: transversal ridges on dorsal side of seeds	1	absent
301	Time of bud burst	5	medium
302	Time of full bloom	5	medium
303	Time of beginning of berry ripening (veraison)	5	medium
304	Time of physiological stage of full maturity of the berry	5	medium
305	Time of beginning of wood maturity	5	medium

Table 1 : Continuation

OIV Code	Descriptor	Expression	Notes
306	Time of autumn colouring of leaves	1	yellow
351	Vigour of shoot growth	5	medium
352	Growth of axillary shoots	5	medium
353	Length of internodes	3	short
354	Diameter of internodes	5	medium
452	Leaf: degree of resistance to Plasmopara	5	medium
452-1	Leaf: degree of resistance to Plasmopara (leaf disc test)	7	high
453	Cluster: degree of resistance to Plasmopara	5	medium
455	Leaf: degree of resistance to Oidium	5	medium
455-1	Leaf: degree of resistance to Oidium (leaf disc test)	7	high
456	Cluster: degree of resistance to Oidium	7	high
458	Leaf: degree of resistance to Botrytis	5	medium

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458-1	Leaf: degree of resistance to Botrytis (laboratory analysis)	5	medium
459	Cluster: degree of resistance to Botrytis	5	medium

Table 2 : Genetic profile of Almuñécar cultivar at 20 microsatellite loci. Allele sizes in base pairs

Microsatellite loci	Allele sizes	
VV1B01	291	295
VMC1b11	166	184
VMC4F3-1	182	206
VVMD5	226	228
VVMD7	246	248
VVMD21	255	265
VVMD24	213	213
VVMD25	246	246
VVMD27	180	194
VVMD28	246	270
VVMD32	262	270
VVIH54	166	166
VVIN16	149	151
VVIN73	264	264
VVIP31	188	192
VVIP60	318	322
VVIQ52	83	83
VVS2	131	149
VVIV37	163	175
VVIV67	375	389

Figure 1 : Morphologic differences in berries of cultivar Almuñécar (A) and Muscat of Alexandria (B)

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Altitudinal Effect on Plant Life Structure in Plains of Tehsil Takht-E-Nasrati, District Karak, Pakistan

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ALTITUDINAL EFFECT ON PLANT LIFE STRUCTURE IN PLAINS OF TEHSIL TAKHT-E-NASRATI, DISTRICT KARAK, PAKISTAN

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Altitudinal Effect on Plant Life Structure in Plains of Tehsil Takht-E-Nasrati, District Karak, Pakistan

Musharaf Khan[α] & Farrukh Hussain[σ]

Abstract - Plant life community structure is a key marker of long-term vegetation change in semi-arid ecosystems. In the present investigation overall 11 plant communities were recorded during summer in plains. The number of plant species differ in different communities. As a whole in plains the *Cenchrus-Zizyphus-Saccharum* community was developed and composed of 32 species. There were 6 tree, 7 shrub and 19 herb species. The Importance value contributed by three dominants species i.e. *Cenchrus biflorus, Zizyphus maurtiana* and *Saccharum bengalense* was 79.5 while total importance value of 220.5 was provided by the remaining species. The contribution by tree was 50.6, shrubs (IV = 62.06) and herbs (IV = 187.3). The soil of the area had better calcium carbonate in the range of (12.3 – 12.7 %), with soil pH (6.06 – 8.13). The concentrations of P and K content were found in the range of (3.64-3.86 mg Kg^{-1}) and (112-127 mg Kg^{-1}). The EC was found in the range of (0.15-0.21 dS m^{-1}). The soil texture was found from sandy clay to sandy clay loam. These results emphasize the continuous need for long-term ground-based ecological monitoring in conjunction with satellite-based monitoring of changes in plant life cover.

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I. Introduction

The Tehsil Takht-e-Nasrati plains comprise one of the richest and most curious ecosystems on earth. The investigated area areas are characterized by low productivity, high intensity of solar radiation and high degree of resource seasonality. The vegetation of this fragile biome is adapted to the insignificant conditions occurring with thin populations. The investigated area low altitude grazing plains are very important being a wild life habitat, water catchment and a livelihood source for nomadic and transhumant inhabitants. The community structure and distribution patterns of investigated area and plains have not been given due attention till the date by the plant ecologists, and hence poorly understood (Khan, 2012). The distribution and community structure of plant life is governed by adverse edaphic and climatic factors; mainly by rainfall and redistribution of water that decrease with the increase in altitude. Temperature is also one of the most important limiting factors controlling the distribution and community structure of investigated area plant life. Here the altitude has much greater effect on temperature than latitude. Mean annual temperature decrease with increase in elevation, more rapidly in summer than in winter. This altitude based temperature gradient is the vital factor shaping the plant life types and determining their diversity and distribution (Heaney and Proctor, 1989; Tanner *et al.*, 1998; Vazquez and Givnish, 1998). Plain areas are characterized by scanty rainfall, high ultraviolet (UV) radiation, high wind velocity, blizzards, low temperature and snowstorms. The plants of this zone show an adaptation to these conditions and are generally dwarfed, stunted, wooly or spiny, and develop a mosaic patch of different forms. They possess an early growth initiation with a tiny vegetative period ranging from several days to a few months. The community as a whole usually exhibits seasonal fluctuations, and its structure and composition are strongly influenced by the extent to which periodic phenomena in the individuals are adjusted to each other (Kershaw, 1973). In investigated area, the plains cover 50% (Khan et al., 2011). These areas are used for grazing during March to October. The plains of research area are severely degraded due to nomadic and sedentary livestock overgrazing. Due to huge population increases and frighteningly increasing urbanization practices, existing reserve forests and grazing lands are overburdened with community rights making it impossible to reduce the grazing pressure (Gupta and Nanda, 1970; Gupta, 1977). Grazing practices are one of the important determinants of vegetation distribution patterns and having most obvious impact on the floral biodiversity of an area (Vallentine, 2001). Many researchers (Vigne, 1842; Duthie, 1892; Stewart, 1961; Dickore, 1995; Negi, 1995; Sardar, 1997; Stainton, 1998; Shinwari and Gillani, 2002) have studied different aspects of vegetation structure and distribution patterns in different parts of Pakistan. Phytosociology or plant sociology is an invaluable method for vegetation survey and assessment involving investigation of characteristics of plant communities using simple and rapidly employing field techniques (Rieley and Page, 1990). In the present study, an effort has been made to investigate and analyse correlation of vegetative attributes with key environmental factors i.e. altitude.

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II. Research Area

The Tehsil Takhti Nasratti is situated at 32.47° to 33.28° North and 70.30 ° to 71.30° East. The Tehsil is bounded by Tehsil Banda Dawood Shah on the North West, Tehsil Karak on the North East, District Mianwali and District Lakki Marwat on the South East, and Tribal area Adjoining District Bannu on the South West (Fig. 1). The total area of Tehsil is about 613.66 Sq. kilometer. Majority of the area consists of rigged dry hills and rough fields areas i.e. 323.97 Sq. kilometers and agriculture land is about 289.7 Sq. kilometer. The major income source of the people is Agriculture, which is rain depended. The area is situated at 340 m above the sea level. Environmental data showed that mean air temperature was high in month of June (39.5° C) and low in month of September (21.95° C), relative humidity was high (77.21%) in month of September and low (30.73 %) in May, rainfall (121.6 mm) was high in July and low (31.6 mm) in May, soil temperature (26.77° C) was high in month of July, wind speed was high in month of June (5.5 Km/h) and low (3.7 Km/h) in September, which indicated dry condition during summer. Summer season started from May to September in the area and 11 plant communities were recognized in plains. The investigated area shows altitudinal variation i.e. from 340m - 500m. This also caused deviation in plant life structure (Table 1).

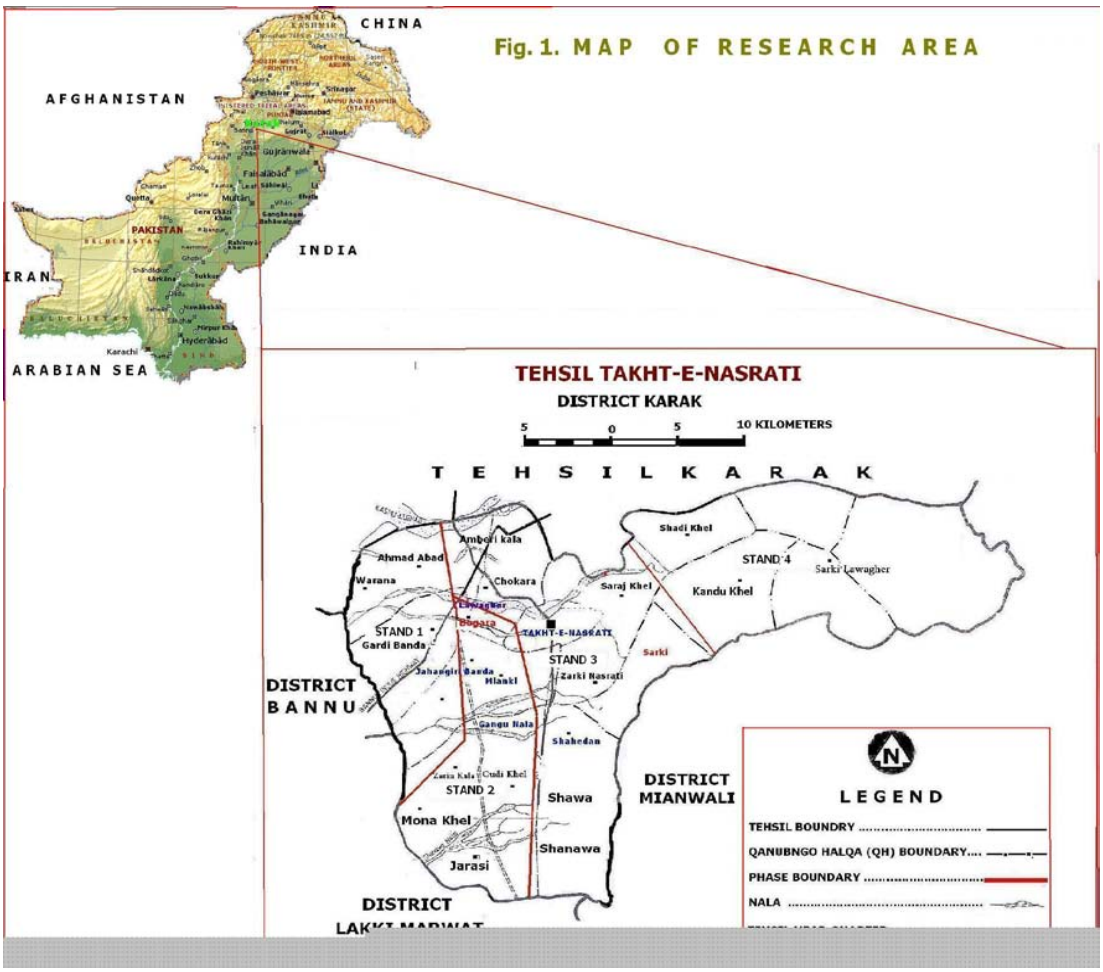

Figure 1 : Map of Tehsil Takht-e-Nasrati showing research spots

Some serious ecological operating problems facing to the area are as follows:

a) Deforestation

A serious ecologically operating problem is rapid cutting of plants (Fig. 2).

b) Over Grazing

Grazing, browsing, and trampling by domestic livestock is a serious problem in the area (Fig. 3). Grazing has caused to decline vegetation where palatable species have been reduced and non-palatable species increased.

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Figure 2 : Cutting of trees in the area is a common ecological problem

Figure 3 : Over Grazing has caused *Zizyphus maurtiana* to assume bushy habitat

c) Shortage of Water

Water shortage is one of the most threatening factors for irrigation and drinking because the rainfall is scanty in the area and it is transported from far off places by donkey, Camel etc or on heads (Figs. 4, 5).

Figure 4 : Drinking water is a serious problem in the area

Figure 5 : Open storage water tank for collection of rain water

d) Soil Salinity

Some areas like Warana is facing salinity hazard. The water is neither suitable for cultivation nor for drinking It has poor sparse vegetation.

e) Soil Erosion

Soil erosion by the seasonal torrential stream water / wind in the plain and by rainwater in sloping area is also a threat to habitat (Fig. 6).

Figure 6 : Plant species like *Saccharum bengalense* is effected by wind erosion in plain area

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Table 1 : Meteorological data of Tehsil Takht -e -Nasrati for the year 2001-2010

Months	Temperature (C°)		Humidity (%)		Rainfall (mm)	Soil temperature (C°) Average	Wind speed (Km Per/ Hour)
	Max	Min	Max	Min			
January	19.18	4.26	75.80	35.24	27.43	7.03	2.9
February	21.69	7.29	77.39	42.23	37.72	9.14	3.2
March	28.20	12.06	75.38	35.23	37.17	13.89	3.5
April	34.74	17.94	66.12	29.42	36.54	19.02	5.2
May	38.32	22.33	59.66	30.73	31.6	21.87	5.4
June	39.50	25.9	59.96	32.89	74.24	25.78	5.5
July	38.44	25.76	73.33	38.76	121.6	26.77	5.2
August	36.66	25.29	75.68	42.61	108.3	26.37	4.1
September	35.47	21.95	77.21	39.29	61.58	23.49	3.7
October	32.33	16.79	71.55	35.51	15.13	20.09	3.5
November	26.71	10.01	71.56	36.66	5.80	14.10	3.2
December	21.93	5.67	75.20	35.90	15.38	8.96	3.1
Mean	31.1	16.27	71.57	36.21	47.71	18.04	4.04

Source : Agricultural Research Farm Ahmad Wala Karak

III. Materials and Methods

The phytosociological expeditions were carried out in the summer, 2010 -2011 to the Tehsil Takht-e-Nasrati. Quadrat method was used to study and analyse the plant life dynamics as well as to collect the primary data for statistical analyses. A total of 22 sites were laid in the study area. 10 Quadrats were laid in each selected sites having best representation of floral biodiversity and geographic extent of the area. Vegetation attributes including frequency, density and cover were recorded along with environmental coordinates like latitude, longitude, altitude and slope using GPS. The importance value of each species was compiled adding RD, RF and RC following Hussain (1989). On the basis of the highest importance values of the first three dominant species from each layer, the communities were established and named. Plants from the premises of sampling points as well as isolated vegetation patches were also collected to record maximum number of species and their distribution patterns. Collected samples were pressed, dried and transported to herbarium of University of Peshawar Khyber Pakhtun khawa, Pakistan, where they were identified and classified following Stewart (1961) and Nasir and Ali (1970-94).

IV. Edaphology

Two kg soil sample was collected from 11 sites of Tehsil Takht-e-Nasrati up to 15 cm depending upon the area situation using the outer periphery of plants canopy or at the centre of plants with the help of soil auger and mixed to make a composite sample. It was dried and passed through 2 mm sieve and stored in a polythene bag. There were 5 replicates from each site. These were analyzed for different chemical and physical parameters including soil texture, organic matter, lime contents, pH, EC, phosphorus and potassium as following standard methods (Bouyoucos, 1962; Hussain, 1989; Jackson, 1962).

V. Results

a) Stand – 1 (340 – 399 m)

In stand 1, collectively 27 plant species consisting of 6 trees, 6 shrubs, 13 herbs and 2 grasses constructing 4 communities i.e. *Eragrostis-Calotropis-Prosopis* community (ECP), *Phoenix-Saccharum-Cenchrus* community (PSC),*Aerua-Prosopis-Saccharum* community (APS) and *Tribulus-Prosopis-Saccharum* community (TPS) were found in Tater Khel, Gardi Banda, Ahmad Abad and Warana respectively. The TIV contributed by three dominant plant species forming a community was high (109) in ECP while low 89.71 in TTS. The highest amount of TIV of tree (64.24) and grasses (61.72) was found in ECP while shrubs (81.85) and herbs (171.5) were found in APS and TTS respectively (Tables 2 - 5). The details are as follows:

b) Eragrostis-Calotropis -Prosopis community (ECP)

Eragrostis- Calotropis -Prosopis community was composed of 15 species comprising 4 tree, 4 shrubs, 5 herb and 2 grass species at Tater Khel. The Importance value contributed by three dominants species i.e. *Eragrostis poaoides, Calotropis procera* and *Prosopis farcta* was 109.09 while total importance value of 190.91 was provided by the remaining species. The contribution by tree was 64.2, shrubs 67.58, herbs 106.49 and grass 61.73. The associated species in herbaceous stratum included *Cenchrus biflorus* (IV=29.12), *Heliotropium europaeum* (IV = 26.14) and *Chrozophora obliqua* (IV =

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25.25), *Saccharum bengalense* (IV = 16.51) and *Datura metel* (IV = 10.52) in shrubby stratum. In tree stratum, the important species were *Zizyphus maurtiana* (IV=12.39) and *Phoenix dactylifera* (IV 10.04) (Table 2). The life form spectrum showed that therophytes (5 spp., 33.33%) was dominant life form class followed by megaphanerophytes (4 spp., 26.67%) while hemicryptophytes and nanophanerophytes (2 spp., 13.33 %) shared each. The vegetation was theromegaphanerophytic. In the leaf form classes, microphyll with 40 % was the leading group. The community preferred to grow on high percentage of sand (63%) and low amount of silt (6%) and clay (31 %) particles. The soil of the community had better calcium carbonate (12.57 %) with alkaline soil pH (7.31). The concentrations of P AND K content were found in the range of 3.78 and 119.1 mg Kg^{-1}. The community preferred EC in the range of 0.18 dS m^{-1}. The soil texture was found sandy clay loam.

c) Phoenix- Saccharum -Cenchrus community (PSC)

Phoenix–Saccharum-Cenchrus community was present at Gardi Banda. This community was supported by 14 plant species in which 3 trees, 4 shrubs, 6 herbs and single grass specie. The dominant plant species were *Phoenix dactylifera* (IV = 38. 6) in tree stratum followed by *Saccharum bengalense* (IV = 37. 9) in shrub stratum and *Cenchrus biflorus* (IV = 37. 5) in herb stratum. *Zizyphus maurtiana* (7. 67) and *Dalbergia sissoo* (5.14) were associated member in tree stratum. The important species in shrub stratum were *Saccharum spontaneum* (IV = 19. 84) and *Calotropis procera* (IV = 9. 19) (Table 3). Ground cover consisted of herbaceous plants had high variety in this period. Biological spectrum showed that therophytes (4 spp., 28.57%), megaphanerophytes (3 spp., 21. 43%) and hemicryptophytes (3 spp., 21. 43) were the dominant life form classes and microphyll (10 spp., 71. 43 %) was the major leaf form classes in the community. The community preferred to grow on high percentage of sand (65%) and low amount of silt (3%) and clay (32 %) particles. The soil of the community had better calcium carbonate (12.34%) with alkaline soil pH (7.66). The concentrations of P AND K content were found in the range of 3.79 and 125.6 mg Kg^{-1}. The community preferred electrical conductivity (EC) in the range of 0.16 dS m^{-1}. The soil texture was found sandy clay loam.

d) Aerua- Prosopis -Saccharum community (APS)

Aerua- Prosopis -Saccharum community was established at Ahmad Abad and is dominated by *Aerua persica* (32. 1), *Prosopis farcta* (31. 62) and *Saccharum spontaneum* (30. 64). The associated species of the tree stratum included *Zizyphus maurtiana* (18. 12) and *Acacia nilotica* (IV = 5. 16). Co dominant species included *Cenchrus biflorus* (23.57), *Fagonia cretica* (23.4) and *Peganum hermala* (22. 03) in ground stratum; *Saccharum bengalense* (IV=21.76) and *Calotropis procera* (IV = 10. 08) were making shrubby stratum (Table 4). The community was composed of 18 species comprising of 4 tree, 6 shrubs, 7 herb and 1 grass species. The Importance value contributed by tree was 58.97, shrubs 81.85, herbs 140.8 and grass 18.38. Hemicriptophytes were the dominant class of the biological spectrum (5 spp., 27.77%) followed by therophytes, nanophanerophytes and megaphanerophytes (4 spp., 22.22%) shared each. In leaf size classes, (9 spp., 50 % microphyll followed by megaphyll (4 spp., 22.22%) and leptophyll (2 spp., 11.11%). The community preferred to grow on high percentage of sand (70%) and low amount of clay (26 %) and silt (4%) particles. The soil of the community had better lime (12.6 %) with alkaline soil pH (7.13). The concentrations of p and K content were initiated in the range of 3.77 and 114 mg Kg-1. The community preferred EC and SOM in the range of 0.19 dS m-1 and 1.27 % respectively. The soil texture was found sandy clay loam.

e) Tribulus - Prosopis -Saccharum community (TPS)

TPS community was composed of 17 species comprising 4 tree, 4 shrubs, 8 herb and 1 grass species at Warana. The Importance value contributed by three dominants species i.e. *Tribulus terrestris, Prosopis farcta* and *Saccharum bengalense* was 89.68 while total importance value of 210.32 was provided by the remaining species. Associated species included *Carthamus oxycantha* (IV=28.9), *Cyperus rotundus* (IV = 28.6), *Cenchrus biflorus* (IV = 26.7) of ground stratum and *Periploca aphylla* (IV=22.4) and *Calotropis procera* (IV = 10.7) were making shrubby stratum. The associated species of the tree stratum *Zizyphus maurtiana* (IV =10.87) and *Tamarix aphylla* (IV = 5.6) (Table 5). The qualitative examination of biological spectrum showed that therophytes (5 spp., 29.41 %) dominated followed by hemicryptophytes, nanophanerophyte and megaphanerophyte (3 spp., 17.65 %) each. In leaf size examination, microphyll (9 spp., 52.94 %) was the dominant class. The community preferred to grow on high percentage of sand (61%) and low amount of clay (33 %) and silt (6%) particles. The soil of the community had better lime content (12.4 %), SOM (1.28 %), EC (0.21 dS m^{-1}), P (3.76 mg Kg^{-1}) and K (121 mg Kg^{-1}) with alkaline soil pH (8.13). The soil texture was found sandy clay loam.

Overall plant life of stand 1 was dominated by therophytes and hemicryptophytes (7 spp., 25.92%) each and microphyll (12 spp., 44.42 %) followed by leptophyll, nanophyll and megaphyll (4 spp., 14.81 %) each. Small leaf size indicating dry and xeric condition while large size leaves indicated cool and moist conditions. As a whole the plant life was dry tropical in nature during summer.

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f) Stand – 2 (400 – 499 m)

In this stand, 7 communities of 45 plant species comprising 4 trees, 5 shrubs, 32 herbs and 4 grasses. The *Cenchrus-Saccharum-Zizyphus* community (CSZ) was found in Southern area of Bogara, *Cenchrus-Saccharum-Acacia* community (CSA) in Northern area of Bogara, *Zizyphus-Cenchrus-Saccharum* community (ZCS) in Gandiri Khattak, *Saccharum-Cenchrus-Zizyphus* community (SCZ) in Kiri Dhand, *Cenchrus-*Calligonum*-Acacia* community (CCA) in Jahangiri Banda, *Zizyphus-Cenchrus-Calligonum* community (ZCC) in Mona Khel and *Cenchrus-Zizyphus-Saccharum* community (CZS) in Jarassi. The highest number of species (30) was present in CSZ. The highest number of trees (4) was found in CSZ and CSA while the highest number of shrubs and herbs in SCZ and CSZ respectively. The highest TIV contributed by three dominant species was 200.63 in ZCS at Gandiri Khattak while low 89.90 in SCZ at Kiri Dhand. Furthermore, the highest TIV contributed by trees (93.70), shrubs (90.29), herbs (134.58) and grasses (90.94) in ZCS, CCA, SCZ and CSA respectively (Tables 6-12).

g) Eragrostis -Saccharum -Zizyphus community (ESZ)

Eragrostis- Saccharum -Zizyphus community was established at Southern area of Bogara and composed of 24 species consisted of 4 tree, 4 shrubs, 14 herb and 2 grass species. This community was dominated by *Eragrostis poaoides* (IV = 34.6) in herb strata, *Saccharum bengalense* (IV = 21.4) in shrubby strata and *Zizyphus maurtiana* (IV=15.3) in tree strata. The Importance value contributed by tree strata was 30.67, shrubby strata (IV = 52.56) and herbaceous strata (IV = 216.77) (Table 6). The qualitative result of life form classes revealed that hemicryptophytes (7 spp., 29.17%) followed by therophytes (6 spp., 25 %) were dominant classes. Microphyll (12 spp., 50%) followed by leptophyll and mesophyll (4 spp., 16.17%) each were most signifying classes of leaf form spectrum. The community preferred to grow on high percentage of sand (72%) and low amount of clay (24 %) and silt (4%) particles. The soil of the community had better lime contents (12.6 %) with soil pH (6.86). The concentrations of P and K content were initiated in the range of 3.67 and 123 mg Kg^{-1}. The community preferred EC and SOM in the range of 0.17 dS m^{-1} and 1.31 % respectively. The soil texture was found sandy clay loam.

h) Tribulus –Acacia- Saccharum community (TAS)

Tribulus-Acacia-Saccharum community was developed at Northern area of Bogara and was dominated by *Tribulus terrestris* (IV = 41.8) in herbaceous strata, *Acacia nilotica* (IV = 27.1) in tree strata and *Saccharum bengalense* (IV = 26.1) in shrubby strata. *Eragrostis poaoides* was the second leading dominant associate of herbaceous strata with (IV = 25.1). This community was supported by 19 plant species included 4 tree, 4 shrubs, 10 herb and 1 grass species (Table 7). The Importance value contributed of important value by tree was 46.34, shrubs (IV = 47.07), herbs (IV=181.47) and grass (IV = 25.12). Hemicryptophytes and therophytes (5 spp., 26.31 %) each were dominating all the life form classes followed by Megaphanerophyte (4 spp., 21.05 %). Microphyll (10 spp., 52.63 %) had represented leading leaf form spectrum. The community preferred to grow on high percentage of sand (51%) followed by clay (43 %) and silt (6%) particles. The soil of the community had lime contents (12.7 %) with soil pH (6.72). The concentrations of P and K content were initiated in the range of 3.68 and 116 mg Kg^{-1}. The community preferred EC and SOM in the range of 0.18 dS m^{-1} and 1.44 % respectively. The soil texture was found sandy clay.

i) Zizyphus- Cenchrus- Saccharum community (ZCS)

This community was developed at Gandiri Khattak and composed of 17 species. There were 1 tree, 3 shrubs, 11 herb and 2 grass species. Dominant plant species on the basis of important values were *Zizyphus maurtiana* (IV = 81.8) in tree strata, *Cenchrus biflorus* (IV = 39.2) in herbaceous strata and *Saccharum bengalense* (IV = 36) in shrubby strata. The Importance value contributed by tree was 81.9, shrubs (IV =49.98), herbs (IV = 136.5) and grass (IV = 31.62) (Table 8). Mirophyll was the dominant leaf size class represented by 9 plant species (52.94 %) and therophytes were the leading dominant life form classes (7 spp., 41.18 %) followed by hemicryptophytes (5 spp., 29.41%). The community preferred to grow on high percentage of sand (67 %) followed by clay (30 %) and silt (3 %) particles. The soil of the community had lime contents (12.7 %), EC (0.18 dS m^{-1}) and SOM (1.29 %) with soil pH (6.97). The concentrations of P and K content were initiated in the range of 3.64 and 117 mg Kg^{-1}. The soil texture was found sandy clay loam.

j) Calligonum- Tribulus- Zizyphus community (CTZ)

Calligonum-*Tribulus-Zizyphus* community was established at Kiri Dhand was composed of 19 species. There were 3 tree, 5 shrubs, 9 herb and 2 grass species. The Importance value contributed by three dominants species i.e. *Calligonum polygonoides, Tribulus terrestris* and *Zizyphus maurtiana* was 82.78 while total importance value of 217.22 was provided by the remaining species. The contribution by tree was 25.82, shrubs (IV = 65.45), herbs (IV = 159.88) and grass (IV = 48.83) (Table 9). The biological spectrum showed that therophytes and hemicryptophytes were the leading life form classes (5 spp., 26.32 %) followed by chamophytes (3 spp., 15.79%). Mirophyll and nanophyll were the dominant leaf size classes represented by (8 spp., 42.10%) and (4 spp., 21.05 %) plant species respectively. The community preferred to grow on high

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percentage of sand (45 %) followed by clay (28 %) and silt (27 %) particles. The soil of the community had lime contents (12.6%) with soil pH (6.43). The concentrations of P and K content were initiated in the range of 3.79 and 120 mg Kg^{-1}. The community preferred EC and SOM in the range of 0.19 dS m^{-1} and 1.33 % respectively. The soil texture was found clay loam.

k) Calligonum-Cenchrus-Zizyphus community (CCZ)

Calligonum-*Cenchrus-Zizyphus* community at 500m was composed of 21 species in Zarin Kala. There were 3 tree, 4 shrubs, 12 herb and 2 grass species. Dominant plant species on the basis of important values were *Calligonum polygonoides* (IV = 42.5), *Cenchrus biflorus* (IV = 30.2) and *Zizyphus maurtiana* (IV = 20.5). The Importance value contributed by tree was 32.61, shrubs (IV = 70.55), herbs (IV = 165.04) and grass (IV=31.8) (Table 10). Mirophyll (10 spp., 47.62%) was dominant leaf size class followed by leptophyll (4 spp., 19.05%). The biological spectrum showed that hemicryptophytes was the leading dominant life form class (7 spp., 33.33 %) followed by therophytes (6 spp., 28.57%) in the community. The community preferred to grow on high percentage of sand (62%) followed by clay (34 %) and silt (4 %) particles. The soil of the community had lime contents (12.6 %) and SOM (1.25 %) with soil pH (6.83). The concentrations of P and K content were initiated in the range of 3.81 and 123 mg Kg^{-1}. The community preferred EC in the range of 0.16 dS m^{-1}. The soil texture was found sandy clay loam.

l) Zizyphus- Cenchrus- Saccharum community (ZCS)

ZCS community was established at Mona Khel and dominated by *Zizyphus maurtiana* (IV=58.6) in tree stratum, *Cenchrus biflorus* (IV = 37.5) in herbaceous stratum and *Saccharum bengalense* (IV = 24.6) in shrubby stratum. Other important plant species with respect to importance values were *Euphorbia helioscopia* (IV = 30.5), *Eragrostis poaoides* (IV = 22.7) and *Calligonum polygonoides* (IV = 13.5). A total of 17 plant species in the site composed of 3 tree, 4 shrubs and 10 were included in herbaceous stratum. The Importance value contributed by tree was 71.56, shrubs (IV = 48.95), herbs (IV=156.81) and grass (IV = 22.66) (Table 11). Therophytes (6 spp., 35.29%) were the dominating all the life form classes followed by hemicryptophytes (4 spp., 23.53%) and megaphanerophytes (3 spp., 17.65%). Mirophyll (35.29%) had comprised leading leaf form class. The community preferred to grow on high percentage of sand (63%) followed by clay (32 %) and silt (5 %) particles. The soil of the community had lime contents (12.7%) and SOM (1.26 %) with soil pH (6.19). The concentrations of P and K content were originated in the range of 3.67 and 125 mg Kg^{-1}. The community preferred EC in the range of 0.19 dS m^{-1}. The soil texture was found sandy clay loam.

m) Saccharum-Zizyphus-Cynodon community (SZC)

Saccharum-Zizyphus-Cynodon community was developed at Jarasi and composed of 19 species. There were 3 tree, 4 shrubs, 10 herb and 2 grass species. The Importance value contributed by three dominants species i.e. *Saccharum bengalense, Zizyphus maurtiana* and *Cynodon dactylon* was 88.79 while total importance value of 211.21 was provided by the remaining species. The contribution by tree was 41.69, shrubs (IV = 55.88), herbs (IV = 140.96) and grasses (IV = 61.46) (Table 12). Mirophyll (8 spp., 42.10%) and leptophyll (4 spp., 21.05%) were leading leaf form classes while hemicryptophytes (7 spp., 36.84%) and therophytes (4 spp., 21.05%) were the dominating life form classes in community. The community preferred to grow on high percentage of sand (42%) followed by silt (33 %) and clay (25 %) particles. The soil of the community had lime contents (12.7%) and SOM (1.2 %) with soil pH (6.06). The concentrations of P and K contents were originated in the range of 3.84 and 127 mg Kg^{-1}. The community preferred EC in the range of 0.17 dS m^{-1}. The soil texture was found sandy clay loam.

VI. Discussion

The investigated area comprised of 32 species in the 11 communities during summer in plains. The environmental factors, habitat and different plant life determined communities' structure. Plants communities are useful in classification, naming and identification of plant life structure. Muller Dumbois and Ellenberg (1974) stated that plant community structure interpret and analyze the plant life at diverse revelation and offer immediate information regarding plant life and are origin for deduction of future alteration. Brinkmann *et al.* (2009) evaluated the plant life reaction to ecological situation of open woodlands along an altitudinal and animal palatability preference. The factors which influenced plant life structure are unplanted settlements, overgrazing, erosion, land sliding, habitat destruction, poverty and anthropogenic activities. In plains, during summer, 11 plant communities were identified at various parts of the investigated area at different altitudes. In summer, the plant number are limited due to unavailability of water and high temperature. The diverse plant communities documented in diverse seasons reflected different remains as recognized by Champion *et al.* (1965).

Soil is essential that has continued life on earth and it also helps the plants' growth that increased the competition of grazing animals and human. According to Turner *et al.* (2004) and Shameem *et al.* (2011) stated that the distinctive habitation altered due to increasing human transportation and population. Other progression results into increased the expected attack of organism has been happening the world over. Plant life changed

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the physical and chemical properties of soil. It improves the soil infiltrations, structure and prevents erosion. Shameem *et al.* (2011) and Buckman and Brady (1967) described that the resources of soil is limited and its physical and chemical properties are restricted mostly by humus and clay. Several research works dealing with different features of plant life from diverse parts of the state have been taken out form time to time (Stewart, 1982; Dar *et al.*, 2001). The investigated area presents a limited number of animal and plant species. The investigated area is more suitable for the legume plant due the presence of high content of sand particles in the area. Plant growth somewhat indirectly manipulated through soil structure. It also effects the seedling growth which is very sensitive to physical condition of soil texture. The rigid compacted layer slows down the growth of the seedling for root cannot penetrate easily in such soil.

VII. Conclusion

The area still needs very detailed and comprehensive investigations regarding different vegetative attributes and their correlation with environmental as well as anthropogenic variables. A single study can not serve the whole purpose in such a large, diverse and geographically important area. Repeated and integrated explorations are recommended in all parts of Tehsil Takht-e-Nasrati to explore the dynamic and variations in floral biodiversity. Grazing practices need to be limited and monitored along with creating the awareness among the grazers about conservation and sustainable management of grasslands. Fenced vegetation plots should be designed at regular intervals to act as seed banks in whole Tehsil. Grazing practices should be synchronized with plant growth seasons so that damage to vegetation during flowering stage can be avoided. A great deal can be done about the ethnobotanical application of the local flora by identifying, investigating and evaluating the utilization practices of local folklore. The most important point to be considered is conservation of endemic flora, which has its restricted distribution in the study area and is posed with severe threats due to overexploitation by grazing, medicinal plant harvest and harsh environmental conditions.

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Table 2 : Phytosociological attributes of *Eragrostis-Calotropis-Prosopis* community recorded at Tater Khel, during summer, Tehsil Takht-e-Nasrati, Karak

S.No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.4	40	0.5	1.61	4.55	1.36	7.52
2	*Phoenix dactylifera* L.	0.8	30	1.27	3.23	3.41	3.4	10.04
3	*Prosopis farcta* (Banks & Soland.) J.F. Macbr.	1.6	100	6.05	6.45	11.4	16.4	34.25
4	*Zizyphus maurtiana* Lam.	0.6	50	1.58	2.42	5.68	4.29	12.39
Shrubby layer								
5	*Calotropis procera* (Wild) R.Br.	4.8	100	1.71	19.4	11.4	4.64	35.44
6	*Datura metel* L.	1	50	0.3	4.03	5.68	0.81	10.52
7	*Periploca aphylla* Decne.	0.3	30	0.18	1.21	3.41	0.49	5.11
8	*Saccharum bengalense* Retz.	1.2	90	0.54	4.84	10.2	1.47	16.51
Herbaceous layer								
15	*Carthamus oxycantha* Bieb.	0.9	40	1	3.6	4.55	2.71	10.86
9	*Cenchrus biflorus* Hook. f.	3.2	90	2.22	12.9	10.2	6.02	29.12
10	*Chrozophora obliqua* (Vahl) A. Juss.	1.1	40	6	4.4	4.55	16.3	25.25
11	*Cynodon dactylon* (L.) Pers.	2.5	30	3.25	10.1	3.41	8.82	22.33
12	*Eragrostis poaoides* Beauv.	3.2	90	6	12.9	10.2	16.3	39.4
13	*Euphorbia prostrata* Ait.	1.5	50	1.25	6.05	5.68	3.39	15.12
14	*Heliotropium europaeum* L.	1.7	50	5	6.86	5.68	13.6	26.14

D: Density, F: Frequency, C: Cover, RD: Relative Density, RF: Relative Frequency, RC: Relative Cover.

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Table 3 : Phytosociological attributes of *Phoenix-Saccharum-Cenchrus* community recorded at Gardi banda during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Dalbergia sissoo* Roxb.	0.3	30	0.35	1.06	3.2	0.88	5.14
2	*Phoenix dactylifera* L.	3.1	100	6.7	11	10.8	16.8	38.6
3	*Zizyphus maurtiana* Lam.	0.4	40	0.78	1.41	4.3	1.96	7.67
Shrubby layer								
4	*Calotropis procera* (Wild) R.Br.	0.9	50	0.25	3.18	5.38	0.63	9.19
5	*Periploca aphylla* Decne.	0.7	50	0.25	2.47	5.38	0.63	8.48
6	*Saccharum bengalense* Retz.	6.3	100	1.92	22.3	10.8	4.8	37.9
7	*Saccharum spontaneum* L.	2.5	90	0.54	8.8	9.68	1.36	19.84
Herbaceous layer								
8	*Aerua persica* (Burm.f) Merrill.	1.3	60	5.25	4.59	6.4	13.2	24.19
9	*Boerhavia diffusa* L..	0.9	30	2	3.18	3.2	5.03	11.41
10	*Cenchrus biflorus* Hook. f.	4	100	5	14.1	10.8	12.6	37.5
11	*Eragrostis poaoides* Beauv.	1.9	70	3	6.71	7.5	7.5	21.71
12	*Euphorbia helioscopia* L.	1.6	60	1.5	5.6	6.4	3.77	15.77
13	*Carthamus oxycantha* Bieb.	1.5	50	8.5	5.3	5.38	21.4	32.08
14	*Tribulus terrestris* L.	2.9	100	3.75	10.3	10.8	9.42	30.52

Table 4 : Phytosociological attributes of *Aerua-Prosopis-Saccharum* community recorded at Ahmad Abad during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.3	30	0.34	1.28	3.06	0.82	5.16
2	*Dalbergia sissoo* Roxb.	0.3	20	0.33	1.28	2.04	0.79	4.11
3	*Prosopis farcta* (Banks & Soland.) J.F. Macbr.	1.8	80	6.56	7.66	8.16	15.8	31.62
4	*Zizyphus maurtiana* Lam.	1.1	70	2.6	4.68	7.14	6.3	18.12
Shrubby layer								
5	*Calotropis procera* (Wild) R.Br.	1	50	0.3	4.26	5.1	0.72	10.08
6	*Datura metel* L.	0.6	30	0.18	2.55	3.06	0.43	6.04
7	*Periploca aphylla* Decne.	0.3	30	0.13	1.28	3.06	0.31	4.65
8	*Ricinus communis* L.	0.7	50	0.3	2.98	5.1	0.72	8.8
9	*Saccharum bengalense* Retz.	2.7	80	0.85	11.5	8.16	2.1	21.76
10	*Saccharum spontaneum* L.	4.2	90	1.47	17.9	9.2	3.54	30.64
Herbaceous layer								
11	*Aerua persica* (Burm.f.) Merrill.	2	90	6	8.5	9.2	14.4	32.1
12	*Cenchrus biflorus* Hook. f.	2.5	80	2	10.6	8.16	4.81	23.57
13	*Eragrostis poaoides* Beauv.	1	50	3.75	4.26	5.1	9.02	18.38
14	*Euphorbia helioscopia* L.	1.2	50	1.25	5.1	5.1	3.01	13.21

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15	*Fagonia cretica* L.	1.1	60	5.25	4.68	6.12	12.6	23.4
16	*Peganum hermala* L.	1.3	50	4.75	5.53	5.1	11.4	22.03
17	*Solanum surattense* Burm .f.	0.3	30	3.25	1.28	3.06	7.82	12.16
18	*Tribulus terrestris* L.	1.1	40	2.25	4.68	4.08	5.41	14.17

Table 5 : Phytosociological attributes of *Tribulus–Prosopis-Saccharum* community recorded at Warana during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.2	20	0.54	0.8	1.92	0.84	3.56
2	*Prosopis farcta* (Banks & Soland.) J.F. Macbr.	1.6	90	10.6	6.4	8.65	16.4	31.5
3	*Tamarix aphylla* (L.) Karst.	0.2	20	1.86	0.8	1.92	2.88	5.6
4	*Zizyphus maurtiana* Lam.	0.7	70	0.82	2.8	6.73	1.27	10.8
Shrubby layer								
5	*Calotropis procera* (Wild) R.Br.	0.9	70	0.27	3.6	6.73	0.42	10.7
6	*Datura metel* L.	0.8	50	0.2	3.2	4.81	0.31	8.32
7	*Saccharum bengalense* Retz.	3.5	100	1.53	14	9.62	2.37	26
8	*Periploca aphylla* Decne.	2.9	100	0.73	11.6	9.62	1.13	22.4
Herbaceous layer								
9	*Aerua persica* (Burm.f) Merrill.	0.3	20	3	1.2	1.92	4.65	7.77
10	*Boerhavia diffusa* L.	1.5	60	7.75	6	5.77	12	23.8
11	*Carthamus oxycantha* Bieb.	2.1	80	8.25	8.4	7.69	12.8	28.9
12	*Cenchrus biflorus* Hook. f.	2.2	90	6	8.8	8.65	9.3	26.7
13	*Cyperus rotundus* L.	3.2	60	6.5	12.8	5.77	10.1	28.6
14	*Eragrostis poaoides* Beauv.	1	30	2	4	2.89	3.1	9.99
15	*Euphorbia helioscopia* L.	0.5	30	2	2	2.89	3.1	7.99
16	*Fagonia cretica* L.	0.8	60	4	3.2	5.77	6.2	15.2
17	*Tribulus terrestris* L.	2.6	90	8.5	10.4	8.65	13.2	32.2

Table 6 : Phytosociological attributes of *Eragrostis-Saccharum-Zizyphus* community recorded at Southern Bogara during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Dalbergia sissoo* Roxb.	0.2	20	1.02	0.51	1.82	0.87	3.19
2	*Acacia nilotica* (L.) Delice	0.2	20	0.37	0.51	1.82	0.31	2.64
3	*Phoenix dactylifera* L.	1.2	50	2.27	3.05	4.55	1.93	9.52
4	*Zizyphus maurtiana* Lam.	1.4	80	5.29	3.55	7.27	4.49	15.3
Shrubby layer								
5	*Periploca aphylla* Decne.	0.5	40	0.61	1.27	3.64	0.52	5.42
6	*Calotropis procera* (Wild) R.Br.	0.6	40	0.42	1.52	3.64	0.36	5.52
7	*Calligonum polygonoides* L.	4	100	1.14	10.2	9.09	0.97	20.2
8	*Saccharum bengalense* Retz.	4.5	100	1.05	11.4	9.09	0.89	21.4

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Herbaceous layer								
9	*Aerua persica* (Burm.f.) Merrill.	0.3	20	3	0.76	1.82	2.55	5.13
10	*Boerhavia diffusa* L.	0.6	30	4.5	1.52	2.73	3.82	8.07
11	*Cenchrus biflorus* Hook. f.	3.4	70	10.5	8.63	6.36	8.92	23.9
12	*Chrozophora obliqua* (Vahl) A. Juss.	0.2	20	3	0.51	1.82	2.55	4.87
13	*Citrullus colocynthis* L. Schrad.	0.2	20	5.25	0.51	1.82	4.46	6.79
14	*Cynodon dactylon* (L.) Pers.	2	10	3.75	5.08	0.91	3.19	9.17
15	*Cyperus rotundus* L.	1.1	30	4.5	2.79	2.73	3.82	9.34
16	*Echinops echinatus* Roxb.	2.1	70	10.5	5.33	6.36	8.92	20.6
17	*Eragrostis poaoides* Beauv.	4.4	90	18	11.2	8.18	15.3	34.6
18	*Euphorbia helioscopia* L.	4.6	70	12.8	11.7	6.36	10.9	28.9
19	*Euphorbia prostrata* Ait.	2.8	60	7.75	7.11	5.45	6.58	19.1
20	*Fagonia cretica* L.	0.6	30	3.25	1.52	2.73	2.76	7.01
21	*Peganum hermala* L.	1.5	60	5.25	3.81	5.45	4.46	13.7
22	*Carthamus oxycantha* Bieb.	0.8	20	6	2.03	1.82	5.1	8.95
23	*Solanum surattense* Burm .f.	0.3	10	1.5	0.76	0.91	1.27	2.94
24	*Tribulus terrestris* L.	1.9	40	6	4.82	3.64	5.1	13.6

Table 7 : Phytosociological attributes of *Tribulus–Acacia-Saccharum* community recorded at Nothern Bogara during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	2.5	70	14.8	4.77	7.69	14.6	27.1
2	*Dalbergia sissoo* Roxb.	0.3	30	0.72	0.57	3.3	0.71	4.58
3	*Phoenix dactylifera* L.	0.3	10	0.79	0.57	1.1	0.78	2.45
4	*Zizyphus maurtiana* Lam .	1.1	60	3.61	2.1	6.59	3.56	12.3
Shrubby layer								
5	*Calligonum polygonoides* L.	1	40	0.24	1.91	4.4	0.24	6.54
6	*Calotropis procera* (Wild) R.Br.	2	50	0.3	3.82	5.49	0.3	9.61
7	*Periploca aphylla* Decne.	0.7	30	0.18	1.34	3.3	0.18	4.81
8	*Saccharum bengalense* Retz.	7.5	90	1.95	14.3	9.89	1.92	26.1
Herbaceous layer								
9	*Boerhavia diffusa* L.	1.4	40	4.75	2.67	4.4	4.68	11.7
10	*Carthamus oxycantha* Bieb.	0.7	30	4.5	1.34	3.3	4.44	9.07
11	*Cenchrus biflorus* Hook. f.	8	80	14.3	15.3	8.79	14.1	38.2
12	*Chrozophora obliqua* (Vahl) A. Juss.	0.6	30	4.5	1.15	3.3	4.44	8.88
13	*Citrullus colocynthis* L. Schrad.	0.1	10	3.75	0.19	1.1	3.7	4.99
14	*Cyperus rotundus* L.	1.9	40	6	3.63	4.4	5.91	13.9
15	*Eragrostis poaoides* Beauv.	3.7	70	10.5	7.06	7.69	10.4	25.1
16	*Euphorbia helioscopia* L.	3.3	60	9	6.3	6.59	8.87	21.8
17	*Euphorbia prostrata* Ait.	9	40	1	17.2	4.4	0.99	22.6
18	*Peganum hermala* L.	1.1	30	3.25	2.1	3.3	3.2	8.6
19	*Tribulus terrestris* L.	7.2	100	17.3	13.7	11	17.1	41.8

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Table 8 : Phytosociological attributes of *Zizyphus-Cenchrus-Saccharum* community recorded at Gandiri Khattak during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Zizyphus maurtiana* Lam.	2.4	90	132	8.824	11.5	61.5	81.8
Shrubby Layer								
3	*Calotropis procera* (Wild) R.Br.	0.7	50	0.3	2.574	6.41	0.14	9.12
4	*Periploca aphylla* Decne.	0.3	30	0.08	1.103	3.85	0.04	4.99
	Saccharum bengalense Retz.	6	100	2.38	22.06	12.8	1.11	36
Herbaceous layer								
5	*Boerhavia diffusa* L.	0.6	40	6	2.206	5.13	2.79	10.1
6	*Carthamus oxycantha* Bieb.	0.8	30	4.5	2.941	3.85	2.1	8.88
7	*Cenchrus biflorus* Hook. f.	4.7	100	19.5	17.28	12.8	9.08	39.2
8	*Cynodon dactylon* (L.) Pers.	2.3	50	7.5	8.456	6.41	3.49	18.4
9	*Echinops echinatus* Roxb.	0.3	30	2	1.103	3.85	0.93	5.88
10	*Eragrostis poaoides* Beauv.	1.6	40	4.75	5.882	5.13	2.21	13.2
11	*Euphorbia helioscopia* L.	0.4	20	3	1.471	2.56	1.4	5.43
12	*Euphorbia prostrata* Ait.	1.6	30	6.75	5.882	3.85	3.14	12.9
13	*Fagonia cretica* L.	0.4	30	4.5	1.471	3.85	2.1	7.41
14	*Heliotropium europaeum* L.	1.2	30	4.5	4.412	3.85	2.1	10.4
15	*Launaea nudicaulis* (L.) Hook. f.	1.1	30	3.25	4.044	3.85	1.51	9.4
16	*Solanum surattense* Burm .f.	0.4	30	4	1.471	3.85	1.86	7.18
17	*Tribulus terrestris* L.	2.4	50	9.75	8.824	6.41	4.54	19.8

Table 9 : Phytosociological attributes of Calligonum-*Tribulus*-Zizyphus community recorded at Kiri Dhand during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.5	40	0.68	1.69	3.7	1.28	6.68
2	*Dalbergia sissoo* Roxb.	0.3	30	0.37	1.02	2.78	0.7	4.49
3	*Zizyphus maurtiana* Lam.	0.8	80	2.4	2.71	7.41	4.53	14.6
Shrubby Layer								
4	*Calligonum polygonoides* L.	6.3	100	2.48	21.4	9.26	4.68	35.3
5	*Calotropis procera* (Wild) R.Br.	0.4	30	0.13	1.36	2.78	0.25	4.38
6	*Datura metel* L.	0.8	40	0.24	2.71	3.7	0.45	6.87
7	*Periploca aphylla* Decne.	1.1	80	0.48	3.73	7.41	0.91	12
8	*Saccharum bengalense* Retz.	0.8	40	0.24	2.71	3.7	0.45	6.87
Herbaceous layer								
9	*Boerhavia diffusa* L.	1.2	70	5.5	4.07	6.48	10.4	20.9
10	*Cenchrus biflorus* Hook. f.	3.4	90	3.5	11.5	8.33	6.6	26.5

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11	*Chrozophora obliqua* (Vahl) A. Juss	0.3	30	4.5	1.02	2.78	8.49	12.3
12	*Cymbopogon jwarancusa* (Jones) Schult.	0.5	50	7.5	1.69	4.63	14.1	20.5
13	*Cyperus rotundus* L.	3	50	3.75	10.2	4.63	7.07	21.9
14	*Eragrostis poaoides* Beauv.	2.7	70	6.75	9.15	6.48	12.7	28.4
15	*Euphorbia helioscopia* L.	1.9	50	1.25	6.44	4.63	2.36	13.4
16	*Heliotropium europaeum* L.	0.3	20	3	1.02	1.85	5.66	8.53
17	*Solanum surattense* Burm .f.	1.4	70	1.75	4.75	6.48	3.3	14.5
18	*Carthamus oxycantha* Bieb.	0.6	50	1.25	2.03	4.63	2.36	9.02
19	*Tribulus terrestris* L.	3.2	90	7.25	10.8	8.33	13.7	32.9

Table 10 : Phytosociological attributes of Calligonum-*Cenchrus*-*Zizyphus* community recorded at Jahangiri banda during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.3	30	0.28	0.6	2.75	0.38	3.73
2	*Dalbergia sissoo* Roxb.	0.8	50	1.63	1.6	4.59	2.2	8.39
3	*Zizyphus maurtiana* Lam.	2.7	80	5.74	5.4	7.34	7.75	20.5
Shrubby layer								
4	*Calligonum polygonoides* L.	15.2	100	2.2	30.4	9.17	2.97	42.5
5	*Calotropis procera* (Wild) R.Br.	0.6	40	0.24	1.2	3.67	0.32	5.19
6	*Periploca aphylla* Decne.	0.5	40	0.33	1	3.67	0.45	5.12
7	*Saccharum bengalense* Retz.	3.5	100	1.14	7	9.17	1.54	17.7
Herbaceous layer								
8	*Aerua persica* (Burm.f) Merrill.	0.3	20	1.75	0.6	1.83	2.36	4.8
9	*Boerhaavia diffusa* L.	0.8	40	3.5	1.6	3.67	4.73	10
19	*Carthamus oxycantha* Bieb.	0.8	30	0.75	1.6	2.75	1.01	5.36
10	*Cenchrus biflorus* Hook. f.	4.6	100	8.75	9.2	9.17	11.8	30.2
11	*Citrullus colocynthis* L. Schrad.	0.2	30	9.25	0.4	2.75	12.5	15.6
12	*Cynodon dactylon* (L.) Pers.	2.5	20	5	5	1.83	6.75	13.6
13	*Cyperus rotundus* L.	1.9	50	3.75	3.8	4.59	5.06	13.5
14	*Eragrostis poaoides* Beauv.	2.8	60	5.25	5.6	5.5	7.09	18.2
15	*Euphorbia helioscopia* L.	3.8	70	6.25	7.6	6.42	8.44	22.5
16	*Euphorbia prostrata* Ait.	4.4	90	3.5	8.8	8.26	4.73	21.8
17	*Fagonia cretica* L.	0.6	30	3.25	1.2	2.75	4.39	8.34
18	*Peganum hermala* L.	1.5	60	5.25	3	5.5	7.09	15.6
20	*Solanum surattense* Burm .f.	0.3	10	1.5	0.6	0.92	2.03	3.54
21	*Tribulus terrestris* L.	1.9	40	4.75	3.8	3.67	6.41	13.9

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Table 11 : Phytosociological attributes of *Zizyphus-Cenchrus-Saccharum* community recorded at Mona Khel during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.2	20	0.23	0.64	2.27	0.3	3.21
2	*Dalbergia sissoo* Roxb.	0.7	50	1.4	2.23	5.68	1.84	9.76
3	*Zizyphus maurtiana* Lam.	4	100	26.2	12.7	11.4	34.5	58.6
Shrubby layer								
4	*Calligonum polygonoides* L.	2.6	40	0.51	8.28	4.55	0.67	13.5
5	*Calotropis procera* (Wild) R.Br.	0.4	40	0.24	1.27	4.55	0.32	6.14
6	*Datura metel* L.	0.3	30	0.18	0.96	3.41	0.24	4.6
7	*Saccharum bengalense* Retz.	3.7	100	1.14	11.8	11.4	1.5	24.6
Herbaceous layer								
8	*Boerhaavia diffusa* L.	0.8	40	3.5	2.55	4.55	4.61	11.7
9	*Carthamus oxycantha* Bieb.	0.2	20	0.5	0.64	2.27	0.66	3.57
10	*Cenchrus biflorus* Hook. f.	4.6	100	8.75	14.6	11.4	11.5	37.5
11	*Citrullus colocynthis* L. Schrad.	0.3	30	9.25	0.96	3.41	12.2	16.6
12	*Cyperus rotundus* L.	1.9	50	3.75	6.05	5.68	4.94	16.7
13	*Eragrostis poaoides* Beauv.	2.8	60	5.25	8.92	6.82	6.92	22.7
14	*Euphorbia helioscopia* L.	4.3	70	6.75	13.7	7.95	8.89	30.5
15	*Euphorbia prostrata* Ait.	3.9	90	3.5	12.4	10.2	4.61	27.3
16	*Fagonia cretica* L.	0.6	30	3.25	1.91	3.41	4.28	9.6
17	*Solanum surattense* Burm .f.	0.1	10	1.5	0.32	1.14	1.98	3.43

Table 12 : Phytosociological attributes of *Saccharum–Zizyphus-Cynodon* community recorded at Jarassi during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.3	30	0.4	1.62	3.13	1.26	6.01
2	*Dalbergia sissoo* Roxb.	0.5	50	1.9	2.7	5.21	5.98	13.9
3	*Zizyphus maurtiana* Lam.	1.7	100	0.7	9.19	10.4	2.2	21.8
Shrubby layer								
4	*Calotropis procera* (Wild) R.Br.	0.6	60	0.36	3.24	6.25	1.13	10.6
5	*Datura metel* L.	0.8	60	0.54	4.32	6.25	1.7	12.3
6	*Periploca aphylla* Decne.	0.4	40	0.24	2.16	4.17	0.76	7.08
7	*Saccharum bengalense* Retz.	2.2	100	1.14	11.9	10.4	3.59	25.9
Herbaceous layer								
8	*Aerua persica* (Burm.f.) Merrill.	0.3	20	1.75	1.62	2.08	5.51	9.21
9	*Boerhaavia diffusa* L.	0.8	40	1	4.32	4.17	3.15	11.6
10	*Cenchrus biflorus* Hook. f.	1.7	100	2.5	9.19	10.4	7.87	27.5
11	*Citrullus colocynthis* L. Schrad.	0.2	20	5.25	1.08	2.08	16.5	19.7

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12	*Cynodon dactylon* (L.) Pers.	1.3	30	3.25	7.03	3.13	10.2	20.4
13	*Cyperus rotundus* L.	1.7	50	1.25	9.19	5.21	3.93	18.3
14	*Eragrostis poaoides* Beauv.	3.5	100	3.75	18.9	10.4	11.8	41.1
15	*Euphorbia prostrata* Ait.	0.8	50	2.5	4.32	5.21	7.87	17.4
16	*Fagonia cretica* L.	0.5	40	1	2.7	4.17	3.15	10
17	*Launaea nudicaulis* (L.) Hook. f.	0.2	20	0.5	1.08	2.08	1.57	4.74
18	*Solanum surattense* Burm .f.	0.2	20	3	1.08	2.08	9.44	12.6
19	*Tribulus terrestris* L.	0.8	30	0.75	4.32	3.13	2.36	9.81

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Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

Structure

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

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The Global Journals Inc. (US) are enclosed by our publishing's Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

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Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. **Pick a good study spot:** To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. **Think technically:** Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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