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EDITORIAL

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِيْمِ

IN THE NAME OF ALLAH (SWT), THE MERCIFUL, THE BENEFICIENT.

The respected members Board of Editors and all Dignified Referees of Pakistan Journal of Livestock Sciences (Pak.JLSc.), approved the publishing of the present issue, Vol-VIII, No.08-2016, with satisfaction and its continuation in the coming years, In.Sha.Allah.

The Editorial Board in their two different meetings (i) in May-2016 and (ii) in November-2016 accorded the approval of only Refereed reviewed articles. The total number of articles received, reviewed, peer-reviewed approved, published and in hand, are ten (10) articles No.63 through 72), while one dropped for improvement. Out of the approved 04 pertain to Education, 03 Livestock and one each in the Field of Forestry, Agriculture, Environment, and Sustainable Rural Development respectively.

The format of the write up of each article has been updated in the light of international set-up, as recommended by the HEC and our future ON-LINE effort, as pointed out by the contemporary Editors of approved journals, but one column write-up in every page. The website allotted to us www.Pak.JLSc.Org had an effective impact to all our authors and co-authors the scientists who have shown confidence in our sustained efforts, since 2009.

The number of copies form this volume VIII, No.8, onwards will not be less than 400 with 60%, 240 will be distributed to 60 teaching, 12 Research Institutions, 24 Referees, 12 Members Editorial Board, Ministries & Departments in the country on gratis basis. The remaining 40% (160) will be sold @ Rs.300/- and/or with a reduced rate of Rs.200/- each for graduate students of 13 Universities, involved in Research work, including AIOU, UAA Rawalpindi, Agriculture Universities Khyber P.K., Faisalabad-UVAS, SAU Tandojam, NARC, QAU, Chakdara (Lower Dir), Kohat, Swat, Karak, Gomal University, BZU Multan and others.

The Authors contribution has also been decided to be the same as Rs.2000/- per article. All the members Editorial Board and Referees are making their efforts without any remuneration.

It is hoped to continue this effort on yearly basis with the blessing of Allah, the Almighty.

Dr. Muhammad Hafeez
Chief Editor

RECENT INSTRUCTIONS/GUIDE LINES FOR CONTRIBUTORS

1. The original Articles/Research papers be sent on A-4 size paper with one inch margin on both right and left sides. The test should be on Font No.11.

2. The standard format should be abstract, introduction, review of literature, material and methods, result, discussion, concussions and recommendations followed by references/literature cited (n alphabetical order). Reference must appear in the text and preferably for the last 10 years.

3. Number of tables be restricted to minimum possible.

4. Two printed (hard copies) and a CD (soft copy) may also be enclosed to quicken the process of References evaluation(s).

5. Colour prints, photographs, if indispensable, (include 200 prints/200 photographs with colour scheme advised). This is negotiable.

6. Reference be kept limited (Not more than ten) preferably for the last 5-10 years. Standard format be adopted.

7. Contribution of Rs.2000/- (Two thousand only) article/paper be enclosed upto four pages. Each extra page will cost Rs.1000/- (one thousand).

8. Abstracts be limited to one para of 100-150 wards in between he A-4 paper supported in separate line, with key words for example.

   Microbiology: Coliform bacilli; E-coli; incidence of food contamination, Pakistan.

   Chemistry; Physico–Chemical analysis; algae, lotus lake water – Pakistan.

9. First screening of the papers will be within one month and acceptance/or other wise will be communicated after a period of 30 (THIRTY) days.

10. Changes/Amendments/Reviewers comments and advises must be attended by the contributor(s) authors and final draft with CDs, be re-submitted to the Chief Editor within 14 days (hard copies of course).

11. Duplications be avoided.

12. Advertisements be sent according to subscribed rates.

13. Selected Scientific paper/Articles will be subjected to PEER REVIEWING simultaneously by the local as well as Foreign Referees, in accordance with the guidelines of HEC Islamabad Pakistan.

14. Year Schedule of Processing Articles of Each Volume is also enclosed.

15. Publishing PJLSc. upto this Volume-VII (No.07) is on Annual basis. The Editorial Board in its 8th and 9th meeting agreed to publish PJLSc. Twice a year (Bi-Annual Basis) immediate after the formal approval of HEC is obtained with possible Financial Assistance.

16. We are now available on www.Pak.JLSc.Org

PROPOSED ANNUAL SCHEDULE OF PROCESSING ARTICLES
Pakistan Journal of Livestock Sciences (PJLSc.)
Vol-IX, No.09 (2017)

Arrival of Articles	January – May, 2017
Submission to Referees	June – July, 2017
Corrections expected	July – August, 2017
9th Editorial Board Meetings	July – August, 2017
Referring back to Authors	August – September, 2017
Final Acceptance	September – October, 2017
Draft typed	October – November, 2017
Proof readings	November – December, 2017
Final printing (Pre-binding proof reading)	December, 2017
Corrected published	December, 2017
Post-printing reading (addendum if any)	Last week
Dispatch to clientele	December, 2017

POSITIVE IMPACT OBSERVED IN HIGH SCHOOL TEACHERS EVALUATED THROUGH ENGLISH LANGUAGE COMPETENCY COURSE (ELCC) IN CHAKLALA, RAWALPIND

Iram Shahzadi*, Farakhanda Rasheed** and Qamar Hussain***

ABSTRACT

Twenty four English teachers of twelve high schools of chaklala region Rawalpindi, comprising 13 female and 11 male teachers participated in English Language Competency Course (ELCC) in August 2014, organized by the Cantt Govt, Directorate of Education Rawalpindi. The research paper evaluated comparative result of four components namely (i) pre test (25 marks) (ii) post test (50 marks) (iii) Group Discussion (10 marks), (iv) Demonstration (15 marks) and summarized the individual performance out of 100 marks. The organizers of the training utilized the expertise of six learned eminent English teachers from different universities and colleges as resource persons for delivering lectures to this class. The results revealed that in the pretest 18 trainees scored marks ranging from 40% to 52%, five of them could obtain 56-60% and only one scored 80%. The post test showed that 12 trainees obtained 56%-68%. Five of them scored 70%-72%. While one trainee each secured 74%, 76%, 77% and 78% marks respectively. Simultaneously one trainee each obtained 90%, 92% and 94% marks. This indicated that a short training course of 10 days improved English language of high school teachers which will have positive on impact students towards better English. The paper ends with conclusions and recommendations.

Key words: English language, short training, course, high school teachers, Rawalpindi Pakistan.

INTRODUCTION:

This paper denotes the critical analysis and evaluation of an English Language Competency Course (ELCC) of a short duration of 10 days (4th to 15th August -2014), organized under the administrative arrangements and supervision of Federal Govt. Educational Institutions (FGEIs) of the Cantonment Govt. cantt. Garrison Rawalpindi. The author wanted to evaluate this ELCC short program comparing the pre test and post test marks obtained and to observe positive impacts through Teacher's Training. The Training Program literary supported by lectures of eminent teachers (qualified and experienced in teaching English, as a subject, for 20-30 years) from universities of repute in the country such as Hi-Tech University, International Islamic University Islamabad (IIUI), Fazaia College, NUML and teachers training wing FGEIs Rawalpindi.

The class of 24 teachers from 12 F.G boys and Girls schools of Chakalala region comprised 13 lady teachers and 12 male teachers who were already

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involved in teaching English to classes in high schools were subjected to this training course. Teachers training have been the topic under discussion in the Federal Ministry of education GOP Islamabad as well as Provincial educational Ministries of Punjab, Sindh, Khyber Pakhtunkhwa and Balochistan including FATA, NAs and AJK where full-fledged teachers training institutions are operational.

This is in line with the Millennium Development Goals (MDGs). Acceleration frame work (MAF) 2013-16 which focus among others, improve quality of Education through teachers training as well as "Improving Utilization of Resources by Educational Institutions" of the National Education Policy (NEP) 2009, of the M/O Education GOP [02]

This effort is also in line with the vision on education 2025 (in the draft policy guidelines) which aim at substantial expansion in access to education as well as making "significant improvement in quality Education" [01]. Utilization of expertise of resource persons are regularly being practiced by Allama Iqbal Open University (AIOU) not only at Matric, FA,BA, MA, M.Ed but also at M.Phil/ MSc.(Hons) and PhD level both in tutorial classes as well as in each Semester Workshops in different Subjects since 15 to 20 years.[04][05].

Most of the NGOs working with Education Foundations of provinces affiliated with USAID, Education as well as British Council Education funded projects of schools and the Directorates of Education are not only involved but looking for training manuals such as the one developed by Dr. M. Hafeez Teachers Training Manual (TTM) Volume I and II, in the year 2013, is being used in primary, middle and High schools, in various Districts of the Country [06]. The training program ELCC was limited to only on subject English and this has been evaluated.

MATERIAL AND MTHODS:

The following material was extensively studied for this write up:-

1. Complete introduction of trainees and resource persons.
2. Trainees pre test results.
3. Trainees post test results.

4. Marks sheet of group discussion and demonstration including final scores.

5. Relevant literature.

RESULTS:

1. The pre test evaluation of all trainees indicated that 14 trainees (06 males and 08 females) obtained 40% to 48% out of 25. Ten trainees (05 males and 05 females) obtained 52-60% marks while only one (male) trainee got 80% marks.

2. In the post test five trainees comprising one male and four ladies obtained 56% to 60% marks. Simultaneously nine trainees, (five males and four ladies) obtained marks ranging 64% to 70%, while seven trainees (two males and 5 ladies) scored marks ranging from 72% to 78%. Only three males could obtain 90% to 94% marks, as detailed in table No.1.

3. In the cumulative evaluation of both pre test and post test, with the addition of Group Discussion and demonstration the results indicated that six trainees (one male and five ladies) obtained 55% to 60% marks, ten trainees (seven males and three ladies) scored 61% to 67% marks. Only three ladies obtained 70% to 72 % while only three males scored the highest marks 80% to 86%, in this training program as presented in table No.2.

4. A hundred percent presence of all the 24 trainees in pre test, post test, group discussion and demonstration was evidenced.

CONCLUSION:

1. A clear and positive improvement was observed in the post test evaluation in terms of percentage of marks obtained, as evident from the result, when compared with pre test results.

2. The post test showed the interest and subject matter, the English, improved and training material well digested by the trainees when compared with the pretest evaluation.

3. The individual response of trainees showed more improved and interesting results as there was only one trainee who scored 80% marks in the pre test while three trainees secured 90% to 94% marks in the post test.

4. A fourth improvement was also visible when majority of trainees (fourteen) obtained 56% to 70 % marks in the post test evaluation as compared to 23 trainees who obtained 40% to 60% in pre test results.

5. An important aspect, worth appreciation, was the 100% presence of trainees on each day of training.

RECOMMENDATION:

1. Such training program of shorter duration, is needed to be continued in not only F.G high schools but in all Government schools as well as private schools, on periodic basis.

2. Similar training must also be organized in other subjects.

3. Such training must be organized simultaneously for male and lady teachers in combined or separate programs.

Table No.01 showing the pre-test and post-test training evaluation of trainees in (ELC) Chaklala RWP

Table 1 (a)			Pre test (25 marks)		
Sr.#	Marks Obtained	No. of Trainees	Male	Female	%age
01	11	05	03	02	40%
02	11	04	02	02	44%
03	12	05	01	04	48%
04	13	04	03	01	52%
05	14	02	00	02	56%
06	15	03	01	02	60%
07	20	01	01	00	80%
Total		24	11	13	

Table 1 (b)			Post test (50 marks)		
Sr.#	Marks Obtained	No. of Trainees	Male	Female	%age
01	28	01	00	01	56%
02	29	02	00	02	58%
03	30	02	01	01	60%
04	32	04	01	03	64%
05	33	01	01	00	66%
06	34	02	02	00	68%
07	35	02	01	01	70%
08	36	03	02	01	72%
09	37	01	00	01	74%
10	38	01	00	01	76%
11	39	01	00	01	77%
12	40	01	00	01	78%
13	45	01	01	00	90%
14	46	01	01	00	92%
15	47	01	01	00	94%
Total		24	11	13	

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AN OVERVIEW OF THE STATUS OF EDUCATION AS SEEN THROUGH EXPENDITURE AND THE ACADEMIA IN PAKISTAN

Basharat Mehmood, Bilal Mansoor*'*, Iram Shahzadi**

ABSTRACT

This research cum status paper envisages an update of literacy rate, number of teaching/degree awarding institutions, students enrolled and budgetary allocation of federal government and provincial expenditure in education sector, in the year 2013-14 and 2015. The spending of HEC for various universities in the country and a share of GDP of south Asian counties including Pakistan. The federal government, Governments of Punjab, Sindh, Khyber P.K. and Balochistan had allocated Rs.59.28, 23.31, 14.99, 07.12 and 10.15 billions through their respective Public Sector Development Programs (PSDPs) for 2013-14 while Rs.350 millions allocated for National Vocational and Technical Training Commission (NAVTTC) program. As per commitment of the present regime government of Pakistan and the provincial government, under the 18th amendment in the constitution, stand with one voice to increase the share of 2% of GDP on education to at least 04% in the year 2015 and onwards. Government of Punjab has already increased its allocation to 50% in the year 2013-14 (Rs.23.31 billions) as compared to previous years (Rs.15 billions) government of Balochistan has also increased its allocation to Rs.10-15 billions which is four times than its previous years, amount of Rs.2.15 billions. Simultaneously government of Khyber P.K allocated Rs.11.66 billions which was 63% increased from previous year's Rs.7.12 billions. This indicates the qualified manpower being produced in the country which will not only increase the literacy rate in the country but also this manpower will play important role in the economy of the country.

INTRODUCTION:

Educational expenditure a part of public expense, after World War-II increased in developed and developing countries. Since the governments of many developing nations believe that education plays a vital role in promoting economic growth and has consequently led to investment in the education sector. Theoretically, literature provides support for such policies, however, many studies have been unable to provide support for such policies as pointed out by Pissarides (2000). However, many empirical studies have been unable to provide an economic model to show a relationship between educational expenditure and economic growth. Economic growth defined as "an increase in value of the goods and services produced by an economy", growth is generally measured in real terms, i.e. inflation-adjusted terms, in order to net out

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the effect of inflation on the price of the goods and services produced. It is considered as the annual percentage change in National Income, and has all the merits and demerits of that level variable. Since there have been differences of opinion among researchers about the positive or negative relationship between educational expenditure and economic growth, some studies indicate no impact of education on economic growth (the links between education and economic growth). The countries who believe increasing expenditure on education leading to economic growth like Pakistan, have achieved this objective to a great extent. This paper aims to establish a relationship between education and economic growth in Pakistan and explores any improvement or otherwise in the education results towards economic growth.

Education plays an essential part in developing human capital and accelerating productivity in any country, and is considered a tool for economic advancement. Over period of times researchers have found that correlations exist across countries between economic growth rates and schooling enrollment rates, including enrollment in higher education. Few empirical studies have tried to examine the relationship between investment in human capital and economic growth. Meulmester (1995) suggested that this relationship is not always direct; based on advanced econometric techniques.

The relationship has been tested for countries such as USA, Pakistan, Tanzania and Zambia, Nigeria and India. The results indicated that education expenditure had positive affects on growth. According to Hanushek and Kimko (2000), Countries that have a high rate of enrollment in schools grow faster in terms of per capita income, causing rapid improvement in productivity. According to Krueger (2000), country that improves its educational policies, is more likely to improve other economic policies as well, that will enhance its national growth as stated by Bils and Klenow (2000) and revealed that there is causality between education spending and GDP.

In Pakistan, the expenditure on Education, as percentage, was the lowest 2.0%, as compared to SAARC regional countries. The literacy rate in Pakistan was 60%, very close to Bangladesh 59.8% as reported by World Bank (2014),

Maldives was spending 11.2% of its GDP and its literacy rate was 99% presented in Table No.01. The expenditure has now planned to be not less than 4.00% in the coming years i.e. 2015-16 and onwards, in Pakistan.

Educational Structure in Pakistan: Pakistan has been an indicator of stressing efforts, in line with international approach in terms of gender issue in education. The education system in Pakistan is largely distributed into five levels: primary (grade one through five); middle (grade six through eight); high school or Secondary School Certificate (SSC), (grade nine and ten); intermediate or Higher Secondary School (HSC), (grade eleven and twelve), leading to university degree programs i.e. undergraduate, graduate and post graduate while only 5.1 percent of people aged 17-23 years were currently enrolled in higher education in Pakistan.

To augment the human capital, government of Pakistan has taken numerous steps to improve the education system and educational standards. According to the Education Statistics of 2013-14, literacy rate remained low in rural areas (48%) as compared to urban (74%). Literacy rate in terms of gender was men (69%) and women (45%). Province vise literacy rate indicated, Punjab (59%), Sindh, (59%), Khyber Pakhtoonkhwa (50%) and Balochistan (45%). Total adult literacy rate remained at 57-58%.

A total of 156, 653 Primary Schools with 465,334 teaching staff were functioning in Pakistan. There was an increase of 0.6 % in Primary enrolment (18.468 millions in 2009) as compared to (18.360 million in 2008). Statistics indicated that, 24,322 secondary schools with 439,316 teaching staff were functioning in Pakistan. More-so, the enrolment rate of 2.9 % (2.556 million) was observed in 2009-2010 as detailed in Pak. Economic Survey Reports 2013-14.

Due to lack of employment opportunities, and inadequate research activities, many students and professionals had left Pakistan for the sake of healthier vocation and life. Various measures have been taken by the government to deal with the issue of brain drain in Pakistan over the last few years, to promote and improve the quality of education and educational facilities. Many scholarships programs developed and offered throughout the year to support individuals for

higher education, including indigenous scholarship (table No.02) as reported by HEC (2014).

Table No.01 showing the GDP spending and literacy rate of SAARC regional countries and Pakistan (2013-14).

Sr.#	Country	Spending of GDP share (%)	Literacy rate %
01	Bangladesh	2.4	59.8
02	Bhutan	4.8	52.0
03	India	3.1	73.8
04	Iran	1.7	85.0
05	Maldives	11.2	99.0
06	Nepal	4.6	66.0
07	Pakistan	2.0	60.0
08	Sri-Lanka	2.6	91.2

Source: (i) CIA world fact book (2014)
          (ii) Pak. Economic survey report 2013-14, SAARC secretariat

Table No.02 showing the High education HRD through HEC Projects and programs in Pakistan, eleventh plan (2013-2018)

A.	Overseas Scholarships	Total Planned	Availed	Completed	On going
•	Phase-I	800	742	496	246
•	Phase-II	2000	1425	695	730
•	Faculty Dev.	1500	658	28	630
•	Cuba assisted	1000	970	295	612
B.	**INDIGENOUS SCHOLARSHIPS**				
•	Balochistan & FATA	2010	2001	135	1866
•	Inland Scholars	5000	4736	3686	1052
C.	**NEED BASED/MERIT SCHOLARSHIP**				
•	US Assisted	5000	1050	1046	04
•	Phase-I	600	0	0	0
•	Phase-II	1807	1807	1350	257
•	USAID	3000	0	0	0

Source: HEC, Islamabad, Pakistan.

Table No.03 showing the status of degree awarding institutions in the county with students enrolment (2001-2014).

Years	Institution		Students	Total
	Public	Private		
2000-2001	37	22	59	2,76,274
2004-2005	57	53	110	4,71,964
2008-2009	70	57	127	8,03,507
2012-2013	87	66	153	1,08,000
2013-2014	87	69	156	12,30,000
2014-2015	88	70	158	12,50,000

Source: Ministry of Education, Government of Pakistan, Islamabad, Pak. Economic Survey Reports

Table No.04 showing the enrolment of students in teaching Institutions with number of teaches (2013-14) (in thousands)

Sr.#	Level	Enrolment	Institutions	Teachers
01	Pre-Primary	9468.6	NIL	NIL
02	Primary	18756.3	159.0	423.1
03	Middle	6444.1	42.4	373.9
04	High	3015.7	31.9	505.1
05	Higher Secondary/Inter	1493.7	5.6	159.8
06	Degree College	773.1	1.5	56.8
07	Technical and Vocational Institutions	313.2	3.3	16.4
09	Universities	1969.1	0.141	86.4
	Total	**42233.8**	**243.84**	**1621.5**

Source: Ministry of Education, Government of Pakistan, Islamabad,
Pak. Economic Survey Reports Provincial Education Ministries.

Table No.05 showing PSDP spending under ADP (2014) in education sector of provinces and federal government (in billions)

Punjab	23.31	Federal 59.28
Sindh	14.99	NAVTTC 3.50 millions
Khyber PK	07.12	..
Balochistan	10.15	..
Total		**115.2 Billions**

Under the Millennium Development Goal (MDGs) (01-07) Draft Vision 2025 in the light of Education policy-2009 and 2014, the plan provision/allocation for education, under the 11th (Eleventh) five year plan (2013-2018) and accelerated National Plan of Action (NPA), has been targeted to Rs.784 billions and in this program period 1.326 million schools children will be enrolled in the country (Primary, Middle, Secondary and Higher Secondary, both boys and girls.

During the fiscal year 2013-14, the federal government had allocated Rs.59.28 billions for education, against Rs.57.03 billions in the previous year (with an increase of 4.00% under PSDP).

Under the 18th constitutional amendment, provinces are now independently making allocations for various development projects in their respective provinces. The allocation of each province in their Annual Development Plan (ADPs) 2013-14 (as detailed in the Pak. Economic Survey Reports of this year).

Allama Iqbal Open University (AIOU) Efforts: This open university needs to be discussed as a separate entity in education sector of the country. Established in 1974, with

its 19 (Nineteen) Regional campuses at Islamabad, Bahawal pur, D.G Khan, Faisalabad, Umer Kot, Abbotabad, D.I. Khan, Peshawar, Quetta, Gujrawala, Lahore, Mianwali, Multan, Rahim Yar Khan, Rawalpindi, Karachi, Mirpur, Muzaffarabad, and Skardu. The student enrolment at Matric, FA, BA/BSc., MA/M.Sc., M.Sc(Hons)/M.Phil and Ph.D level were 1.33 million in 2013 and 1.46 million in 2014, the gender-wise student participation was 42% males while 58% females registered. The budgetary position in the year 2014-15 was recurring Rs.28.16 millions while government grant in aid was Rs.275 millions in the same year. The budget generated from own sources was Rs.4496.84 millions. The endowment fund of the AIOU was Rs.6.6 billion in 2014-15. Further details of region wise enrolment of students, tutors, courses, books distributed, students finalized etc. are available in the "AIOU in Brief (2015)".

SUMMARIZED CONCLUDING OUT COMES

1. The National Plan of Action (2013-16) had targeted 5.06 million primary aged, out of school children of 6.7 million with an estimated cost of Rs.189 billion (around US dollar 02 (two) billions.

2. The Government of Pakistan (GoP) is committed to gradually increase the allocation to education sector from 02% to 04% of the GDP, by the year 2018.

3. The "Vision 2025 education goal" is targeted to 100% primary enrolment ratio from the present 57-58%.

4. The GoP also targets the literacy rate from 60% to 90% by the year 2025.

5. The emphasis on Technical education the 11th five year plan (2013-18) indicates vocational and technical education will be increased to 50% as compared to present 27%.

6. The total enrolment, in the 87 public and 70 private (total-157) degree awarding institutions recorded, was 1.23 million which is increasing at a steady rate of 0.32-0.24 million per year from 2015 onwards.

7. Under the 18th constitutional amendment, the provinces are sustainably allocating budgets for education from the year 2014-15 onwards. Punjab has increased this amount to Rs.23.31 billion as compared to previous year's Rs.15 billions.

8. Sindh province has allocated Rs.14.9 billions against last year's Rs.12 billion (25% increase).

9. The government of Khyber Pakhtun Khwa has allocated Rs.11.66 billions against the previous year's allocation of Rs.7.12 billions, on education (63% increase).

10. During the fiscal year 2013-14 government of Balochistan has allocated R.s10.15 billion (which is four times more than the previous year. It is worth mentioning that this allocation is 23.12% of the total Budget allocated under PSDP of Baochistan.

RECOMMENDATIONS:

1. As evident all provincial governments and the Federal Government are increasing budgetary allocation to strengthen educational infrastructure, vacant positions of teachers must be filled, on merit.

2. Although the chapter of education is now province's responsibility, the school, college and universities need well equipped science laboratories and libraries.

3. All provinces must concentrate on teacher's training where teachers are science graduates but lack in B.Ed, or M.Ed. education. These must be provided with at least one month's or two months practical training based on a training manual prepared for teachers.

4. All educational institutions must compete for quality education with strict monitoring, vigilance and paper/answer script evaluation, with encouragement of external evaluation.

5. Government of Pakistan and provincial governments continue making efforts in involving qualified personnel in research and development activities.

6. Research laboratories need manpower (both technical and support staff), equipments and operational budgets regularly.

7. Subject wise research be carried out in collaboration with private sector and market oriented items of use.

8. Innovative research and commercialization be introduced in teaching and research institutions for encouraging research activities.

9. Special position be created for research associates.

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CRITICAL EVALUATION OF RECENT SCENARIO OF LIVESTOCK PRODUCTION IN PAKISTAN

Muhammad Hafeez*

ABSTRACT

This research cum critical evaluation paper provides the comparative Livestock Production, population, share of GDP, gross value addition, milk produced and human consumption of milk for the year 2014-15 and 2015-16 along-with meat production (including, beef, mutton and poultry meat) in these years. This paper also examines the import of 5,205 exotic dairy cows which have additionally increased 39,688 tons of milk per year. The paper while appreciates the import of exotic blood, and/or cross breeding of local non-descript or low producers, also puts forward the improvement and increased production of local potential breeds of cows namely Sahiwal and Red Sindhi which are under the threat of bio-diversity and that their exports be made limited. The population growth in cattle and buffaloes was recorded as 3.7% and 2.97% in 2015-16 as compared to previous years. The milk production of cows and buffaloes has also shown growth @ 3.94% and 2.95% this year (2015-16) as compared to last year (2014-15) and human consumption of milk was recorded, growing @ 4.6% and 3.02% in cows and buffaloe's milk respectively. The overall meat production has shown a growth rate of 4.87% while mutton and poultry meat also showed a growth of 3.07%, 1.49% and 9.34% respectively in 2015-16 when compared with previous year (2014-15).

Keywords: Critical Evaluation of Livestock Production, Milk and Meat Production, Pakistan.

INTRODUCTION:

Almost all the Federal Ministries and Provinces including their Livestock and Dairy Development Departments (LDDDs) have been observed targeting their planning and development to the year 2030. A comprehensive write-up was endeavored by Muhammad Hafeez and Mashook Ai Bhutto in the year 2013 [1] titled "Livestock to the year 2030, setting priorities and targets for further need of milk and meat in the country" in which it was suggested that a total of Rs.150.1 billion (Bns) will be needed over a period of 10 years with a minimum of Rs.15 Bns per year for increased Livestock Production including Breed Improvement on sustainable basis.

Supported with factual data of availability and human consumption of milk and meat in the country, in the light of growing human population boom as upto 242 millions by the year 2030.

An over view of the status of Livestock showed that it was adding 11.8% (in 2015-16) to the National GDP, as compared to 11.7% in the previous year (2014-15) while it contributed 56.3% in the agricultural value added this year as

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compared to 55.6% last year. The encouraging figure of growth of value addition of Livestock at constant cost factor (of 2005-06) has increased from Rs.1201 Bns. in 2013-14 to Rs.1251 Bns. in 2014-15 showing an increase of 4.12%.

The population of cattle grew @ 3.78% from 41.2 millions (in 2014-15) to 42.8 millions (in 2015-16) while the buffaloes have shown an increase of 2.97%, based on 35.6 millions in 2014-15 and 36.6 millions in 2015-16.

Milk gross production has also shown an increase of 0.71 million from (18.70 millions in cows and 3.94% in buffaloes) while 0.95 millions tons from 32.18 million in 2014-15 to 33.13 million tons in the year 2015-16 (2.95%). Similarly the human consumption of milk from cows grew @ 4.6% while this consumption grew @ 3.02% from buffaloes milk as reported by Livestock Wing (2015-16), Ministry of Food Securities & Research, Government of Pakistan, Islamabad.

It is also understood that almost eight (08) million families are directly and indirectly involved with Livestock Production process and at least 35% of their income is derived from Livestock only. Under the strengthening of Livestock Services Project (SLSP) during 2003-2009, a total of 16000 farmers of large animals (cattle and buffaloes) were registered with the Livestock & Dairy Development Board (LDDB) while 14000 farmers were registered with small ruminants (sheep & goats), which were involved in Livestock Production Process.

Meat production has also shown a steady increase of 4.87% during 2015-16 out of this, beef showed 3.07%, mutton 1.49% while poultry meat showed 9.34% in this year, as compared to previous year (Ejaz Wasti – Economic Adviser, Pak. Economic Survey Report, Government of Pakistan, Islamabad (2015-16).

METHODOLOGY:

This paper was prepared from the Data collected from the following sources:-

(i)   Recent update of Livestock Wing, Ministry of Food Securities and Research, Government of Pakistan, Islamabad.

(ii) Pak. Economic Survey Reports of 2014-15 and 2015-16.

(iii) Updates from various publications documented in the end of the paper.

(iv) Final Report of Strengthening Livestock Service Project (SLSP) 2003-2009.

(v)   Import and Export data of Livestock & Livestock Product of Animal Quarantine Department (AQD) of Ministry of Food Securities & Research, Government of Pakistan, Islamabad.

RESULTS:

When compared, the population of 2015-16 increased over last year by 3.7% in cattle and buffaloes 2.97% (Table No.01). Milk produced also showed an increase in cows milk by3.94% while buffaloes it showed 2.95% increase. The population growth in cattle and buffaloes was recorded as 3.7% and 2.97% in 2015-16 respectively as compared to previous year. The milk production of cows and buffaloes also showed growth @ 3.94% and 2.95% this year as compared to last year. Human consumption of milk was recorded as growing @ 4.6% and 3.02% in cow's and buffaloe's milk. The overall meat production showed a growth rate of 4.87% while beef, mutton and poultry meat showed a growth of 3.07%, 1.49% and 9.34% respectively in 2015-16 when compared with the previous year, presented in tables below:-

Table No.01 showing the growth of cattle and buffaloes for the two years   (in millions)

Population	2014-15	2015-16	% growth
Cattle	41.2	42.8	3.7
Buffaloes	35.6	36.6	2.97

Source: (i)   Livestock Wing, Ministry of Food Securities and Research, GOP, ISBD.
(ii)   Pak. Economic Survey Reports

Table No.2 showing milk produced in the country (in million tons)

Population	2014-15	2015-16	% growth
Cows Milk	18.70	17.41	3.94
Buffaloes Milk	32.18	33.13	2.95

Source: (i)   Livestock Wing, Ministry of Food Securities and Research, GOP, ISBD.
(ii)   Pak. Economic Survey Report

Table No.3 showing the human consumption of milk (in million tons)

Population	2014-15	2015-16	% growth
Cows Milk	14.96	15.53	4.6
Buffaloes Milk	25.74	26.51	3.02

Source: (i)   Livestock Wing, Ministry of Food Securities and Research, GOP, ISBD.
(ii)   Pak. Economic Survey Report

Table No.4 showing total Meat produced in the country for two recent years   (in millions tons)

Kind of Meat	2014-15	2015-16	% growth
Beef	1.95	2.01	3.07
Mutton	1.95	0.68	1.49
Poultry Meat	1.07	1.17	9.34
Total Meat	**3.69**	**3.87**	**4.87**

Source: (i)   Livestock Wing, Ministry of Food Securities and Research, GOP, ISBD.
(ii)   Pak. Economic Survey Report

DISCUSSION:

The existing data, the comparative livestock production including population of cattle and buffaloes, milk produced and human consumption including meat production (beef, mutton and poultry meat) is indicative of slow but steady growth rate of not more than 3.4, 2.97 and 2.1%, while the poultry meat increased by 9.5%.

The per capita availability of milk and meat is still less than our National requirements namely milk availability as 28 liters and consumption as 29 liters is still less as fore-casted by Delgado (2003). The author recommended many times for increased milk and meat production, specifically in the text book of "Livestock Industry" (2011), Muhammad Hafeez and Mashook Ali (2013) in an attempt to fore cast, "Livestock to the year 2030". During the years 2003-04 to 2009-10, tangible achievements were recorded with government of Pakistan intervention of Rs.9.1 Bns, PSDP financial assistance under Seven Mega Development Projects implemented throughout the country (LDDB Final Report). The price, though increased in a shooting manner from 2002 (the market rate of milk per liter as was Rs.20/-) rose to Rs.70/- per liter in 2007-08 and recently this rate is Rs.95/- per liter in almost all the big cities of the country, in particular the twin cities of Rawalpindi and Islamabad.

Yet another issue extensively being discussed in various departmental meetings and the Apex Body meeting that import of exotic blood of 5,205 Dairy Cows in the country is no doubt an appreciation as an additional quantity of 39, 688 tons (0.039 million tons) of milk included to National Milk Production, every year but our indigenous cow breeds namely Sahiwal and Red Sindhi are continuously under the threat of bio-diversity (many reference are available).

A comprehensive action plan is thus proposed to be implemented to restore and preserve our indigenous germ plasm limiting the excessive exports of these precious milch animals.

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INCREASED POULTRY PRODUCTION TO THE YEAR-2020: A FIVE YEARS TARGET FOR ALL CONCERNED WITH POULTRY INDUSTRY, IN PAKISTAN

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ABSTRACT

This research cum status paper on poultry sector describes the poultry produced in the country for the year 2014-15, projected figers for 2015-16 and a safe target for the year 2019-20, in the light of population boom in the country viz-a-viz increased agricultural production, in line with future needs of the country. Poultry sector has shown a span of Rs.310 billions (Bns) as both investment and establishment cost of at least Ten (10) areas in poultry sector to the tune of Rs.76-78 Bns with yearly operational cost of the recent year (2014-15) as 182 Bns, totaling to Rs.253 Bns. This has expectedly increased in the year 2015-16 to the tune of Rs.52 Bns. The production figer of poultry birds (including layers 12%, Broilers 20-24%, Breeders 4.5% and day old chicks as 20%) have shown promising growth while the eggs produced during the last two decades as 20-21%. These targets and the future targets to the year 2020 will have to be increased, if not with greater percentage but with an average% in commercial layers upto 10%, desi birds as 4%, breeding stock upto 10% and broilers Not less than 15% while eggs to be produced at least 10% more for our National requirements, in the light of population boom of 247 millions by the year 2020. Being sixth largest populated country of the world will require proteins of animal origin (in the form of eggs and poultry meat). This paper is limited to the estimated targets of poultry sector to the year 2020 with recommendations of sustained efforts of all breeder stock farmers, layers, broilers producers together with hatchery men supported with feed producers, poultry medicines, vaccine's traders and diagnosticians continue such sustained efforts.

Key words: Poultry production, targets for 2020, National requirements, Pakistan.

INTRODUCTION:

The poultry sector, as a whole, is expanding, not only by its span of investment but operational expenditure, as seen through recent years (2013-14 and 2014-15) the total worth of poultry sector in Rs.310 Billions (Bns). No doubt the production targets for recent years i.e. 2013-14 and 2014-15 are far more increased as was in the year 2010-11. The data shows that the poultry birds namely commercial layers have shown 10-11% increase, Desi poultry birds as 4%-4.5% while broilers and day old chicks have shown an average increase of 15% since 2013-14; poultry meat, like wise; has also shown 10.7% to 11.4% increase over the last three years [01].

We understand that the human population is increasing at a slow but steady rate of 2.1% and 2.0% from 2012-13 (184.7 millions) to 191.72, 210.12, 227.26 and 242.06 millions in the years 2015, 2020, 2025 and 2030 respectively, as worked out by National Institute of Population Studies (NIPS), Government of

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Pakistan, Islamabad [02].

The National requirements for food items, in terms of our staple food of wheat, rice, sugar cane and maize including cereals such as pulses are also targeted to be increased by the year 2030, in an endeavor made by Shafique Quadir Memon *et al* (2015) [03] finding ways and means of increase in production for our people, and some export of only the surplus. The poultry sector is fetching more investment, as the information gathered from ten (10) of its entities, recently, in the year 2015, presented in table No.02 shows that (i) 21000 broilers farms, in operation, had invested 17 Bns while 26 Bns was their operational expenditure in 2014-15 and there was an additional investment foreseen to the tune of Rs.02 Bns. The additional amount, as reported to be spend on doubling the sheds and an equal amount on the updating the environmentally controlled sheds with welfare cage system.

Similarly the investment is being increased in (ii) Layer farming, (iii) Hatcheries (iv) Egg production (v) Poultry feed mills (vi) poultry medicines (vii) poultry vaccines (both local production and imports) (viii) poultry equipment, (ix) egg mixed food (value addition) and (x) poultry meat processing and packing etc etc.

The poultry sector has indicated at least 0.45 to 0.5 millions (four and half lacs to five lacs people directly involved in various entities of poultry industry [04] as well as many thousands indirectly involved with poultry production throughout the country. In this paper ways and means are explored for increased production of (a) poultry birds (layers and Broilers), (b) day old chicks in the Hatcheries (c) egg production, and of course, (d) poultry meat production In the days to come amidst price hike, (shooting prices of grains and other bye-products needed for poultry feed production).

It has been observed that the rates of day old chicks (both for broilers as well as for layers) went up in Sept-2015 as Rs.32/- and Rs.62/- each, respectively and upto February-2016, the prices were not declining. Similar is the case with Broilers (ready for sale) which was still in the same range of Rs.100/- to Rs.110/- per kg live weight in Rawalpindi-Islamabad twin cities along-with the egg rate per

dozen also within the same range of Rs.100/- to Rs.110/- per dozen since September-2015 (with 10-12% fluctuation).

The farm rate of Eggs not less than Rs.8/- each or Rs.96/- per dozen, as discussed and rates obtained from the market as well as from various egg producer farmers [05].

The paper was based in the light of the following of its objectives:

(i)   To find out the sustainability of poultry production and its increases in the coming years.

(ii)   To assess the national requirements of poultry meat and eggs for our country by the year 2020 and beyond.

(iii) To point out various constraints in production and to see, somehow, the price hike of poultry and poultry products could be reduced.

MATERIALS AND METHODS:

The following information and data was extensively consulted for the preparation of this write-up:

(i)   Recent information/reports collected from government institution and private sector.

(ii)   Annual reports of laboratory diagnosis of various research institutes namely PRI Shamsabad Rawalpindi, VRIs Lahore, Peshawar, Quetta and NVL, Islamabad.

(iii) Reports from leading private companies of poultry medicines and vaccines (both local production and imports) in the country.

(iv)   Bureau of Statistics, Pakistan repots of three recent years.

(v)   Pak. Economic Survey Reports of three recent years.

RESULTS:

The trend of poultry production (poultry birds) has shown an increase of 9.35% in 2014-15 over 2013-14. Similarly, poultry meat has shown 11.44% increase in the year 2014-15 over the previous year of 2013-14 while egg production has shown 8% increase; as presented in Table No.03.

Table No. 1 Showing the production of poultry in Pakistan for the years 2014-15 and 2015-16, with targets for the year 2020 and beyond.

Sr.#	Items	2014-15	2015-16	2020	% grow
01	Commercial Poultry (Layers)	44.10	47.40	78.4	10%
02	Desi Poultry Birds	85.92	89.33	108.7	4%
03	Breeding Stock	11.22	12.42	18.17	10%
04	Broilers (live)	866.9	1040.64	1867.4	15%
05	Poultry Meat	1.10	1.20	1.68	10%
06	Eggs	12068	13516	18816	10%
07	Day old chicks	866.9	1040.6	1867.4	15%

Source: All related entities of poultry LDF-info. Pak, Islamabad

Table No. 2 Showing the gross estimated investment (Span of Business in Pakistan in (2014-15) and (2015-16) in billions Rs.

Sr.#	Sector entity	Estab. cost 2014-15	Opera-tional cost 2014-15	Total	Increased 2015-16 and 2016-17	Total
01	Poultry farms broilers (21000)	17	26	43	02	45
02	Layers farms (1180)	08	33	41	06	47
03	Hatcheries (37)	05	30	35	02	37
04	Egg Production (87)	08	16	24	08	32
05	Poultry Feed					
	(08 R)	10	30	40	08	48
	(58 S)	03	10	13	01	14
06	Poultry Medicines (31)	05	08	13	05	18
07	Poultry Vaccines (36)	04	06	10	04	14
08	Poultry Equipment (30)	04	08	12	04	16
09	Egg Mixed Food (Value addition)	01	05	06	04	10
10	Poultry meat processing/packing	08	010	18	05	26
	Total	**76**	**182**	**258**	**52**	**310**

Source: All related entities of poultry sector LDF info-Pak, Islamabad.
          R-Running, S-Stopped

Table 3 showing the trend of total poultry produced in the country in recent years   (millions).

Sr.#	Kind of poultry	Years 2013-14	Year 2014-15	Increase	%age
01	Poultry Birds	855	935	80	9.35%
02	Poultry Meat (millions tons)	0.987	1.100	0.113	11.44%
03	Eggs	14554	15573	1019	8%

Source: (i)   Pak. Economic Survey Report 2013-14 and 2014-15.
          (ii)   Livestock Wing, M/o Food Securities & Research, GOP, Islamabad.
          (iii)   News papers, published article and GOP, Islamabad.

Table No.4 Showing the trends of desi poultry produced in the country in recent years (millions)

Sr.#	Kind of poultry	Years 2013-14	Year 2014-15	Increase	%age
01	Poultry Birds	82.08	84.95	2.87	3.5
02	Poultry Meat (million tons)	1.10	1.15	0.46	4.2
03	Eggs	3947	4117	170.00	4.3

Source: (i)   Pak. Economic Survey Report 2013-14 and 2014-15.
       (ii)   Livestock Wing, M/o Food Securities & Research, GOP, Islamabad.
       (iii)   News papers, published article, GOP, Islamabad.

Table No.5 Showing the trend of commercial poultry produced in recent years in Pakistan.

Sr.#	Kind of poultry	Years 2013-14	Year 2014-15	Increase	%age
01	Layers	39.80	45.90	6.10	15.3%
02	Broilers	722.4	809.08	86.68	12%
03	Breeding stock	10.20	11.32	1.12	11.00%
04	Day old chicks	754.54	845.08	90.54	12%
05	Eggs	10586	10723.6	137.6	13%
06	Meat	8.75	975	0.99	11.3%

Source: (i)   Pak. Economic Survey Report 2013-14 and 2014-15.
       (ii)   Livestock Wing, M/o Food Securities & Research, GOP, Islamabad.
       (iii)   News papers, published article, GOP, Islamabad.

DISCUSSION:

Poultry sector has been observed devoted for their commitments of providing healthy poultry meat and eggs to our people, with possible quantity of surplus to be exported. The authors have been actively involved in this sector since their student life of 1968-69 (when cage system was newly introduced). With the passage of time the sector grew at a rapid but sustained manner from small house hold poultry to commercial set-ups, Farms grew from a few hundreds to many thousands, manpower (poultry personnel) reached 1.5 millions and production very clear to everybody, as presented in the tables.

The chain of poultry production is directly linked with breeding stock the hatcheries, the layers and broilers at the farms, the poultry feed medicines and vaccines including market intelligentia. The end user is the common man, always shouting but with low voice the increasing price of poultry meat and eggs. Undoubtedly, we understand that all this productivity is being managed under the universal economic principle of supply and demand. The poultry owners, the feed millers, the hatchery men, the poultry medicines, vaccine and market personnel

must always consider the low-income and mediocre group keeping the prime motto in mind to make less profits.

This will not only increase the production but many hundreds of thousands of our people will be able to eat poultry meat twice a week instead of weekly and at least one egg per family member, daily.

RECOMMENDATIONS:

(i) All poultry sector leading companies must spare 05-06% of theirs profits (annual profits) to Research and Development (R&D), this will help research studies in the universities, as well as the Research Institutes.

(ii) All commercial poultry leaders must support their one-two% of their profits (annual profits) to charity welfare organizations in the country, helping the orphans, widows, the destitute and marginalized people of our society.

(iii) The poultry feed millers must grow, or support the agriculture farmers to grow, their own feed grains (maize, wheat, course rice, gram etc) which will reduce the prices of raw material and lower the price of feed.

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ECONOMIC COMPARISON OF TWO DAIRY UNITS OF REARING BUFF: HEIFERS AND FIRST CALVERS FOR THEIR POTENTIALS, OVER SIX YEARS

Muhammad Hafeez*

ABSTRACT

This efforts describes the comparison of 21 buffalo heifers (Plan-A) grown to adult buffaloes compared with first calvers (21), directly brought to the farm (Plan-B), with the objectives to find out which plan was better, commercially in the long run. The study was conduced in Nili Ravi Buffaloes spread over six years w.e.f. 2011 to 2016. The small farmer owner of 100 kanals of agricultural land and constructed dairy sheds of one kanal (100x54.5 sq.ft.) each and observation recorded, each year. The expenditure of both the plans with income along-with savings indicated that in Plan-A the expenditure was Rs.3.15, 1.62, 2.01, 3.26 and 3.66 millions in the year 2011, 2012, 2013, 2014, 2015 and 2016 respectively. While the income for these years was Rs.0.56, 0.58, 0.65, 0.744 and 0.825 millions for these years. The financial analysis of Plan-B indicated the expenditure for the years 2011 through 2016 as Rs.8.00, 4.50, 5.80, 6.72, 9.54 and 10.62 millions while the income for these six years came to Rs.5.86, 7.16, 9.90, 11.15, 18.44 and 21.44 millions respectively. The agricultural income had been of potatoes on 16 kanals while rest of the 70 kanals under wheat in Rabbi and Maize in Kharif season fetching Rs.0.56, 0.57, 0.58 and 0.59 millions in both plan-A as well as plan-B respectively though out the study period. It was observed that growing heifers to adult buffaloes showed more potentials as compared to directly bringing milch buffaloes after 2nd and 3rd birth at the farm. The farm grown buffaloes were increasing milk production but, adult milch buffaloes needed replacement, one after the other.

Key words: Rearing buff. Heifers, Milk Production Potentials, Punjab, Pakistan.

INTRODUCTION:

As a common practice, the milch buffaloes, preferably first or second calvers, are introduced at dairy farms for milk production. No doubt, buffaloes keep producing milk for 305 days per year and keep breeding. On average for 8-10 years in plane areas of Punjab Province. Dairy farmers, usually grow female buffalo, calves/heifers to adult buffaloes for increasing their stock while some of the farmers also sell heifers at the age of 1-2 years when they need cash money, apart from sale of milk and Farm Yard Manure (FYM). This record presented in this endeavor is the inline with the Livestock Sector Policy guidelines of "Increased milk and meat production in the country.

Livestock Sector's activities are spread all over the country in 6300 Union Councils (UCs). A complete picture of availability of milk and consumption, as well as proposed increased production for the year 2030 is nicely documented by M. Hafeez (2013) in the light of population book indicated by National Institute of

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Population Studies (NIPS), Government of Livestock, as a whole, is categorized as Livestock Industry to which each and every Livestock farmers, milk processing Units (Dairy milk plants), feed mills, the meat producers and all stakeholders are the entities comprising an industry as published by M. Hafeez (2011).

District Okara and its surroundings is a potential farming area for livestock specially Sahiwal cows and Nili-Ravi buffaloes extended from Pottoki, Bhunikey District Kasur upto district Sahiwal and touching Sargodha. The main two markets of Okara animal Markets for Dairy animals and the surrounding small markets of Gojra, Mandi Bahauddin (MBD), Tandlian Wala and Sahiwal district markets are inter-linked and famous for good milk producers.

At least 350 small farmers are registered with the Directorate of Livestock Production, Livestock Production Research Institute (LPRI) Bahadur Nagar. This is a Pivotal central place from which all the registered farmers benefit, in terms of Good Management Practices (GMPs), recent economical feed formulations, Artificial Insemination (A.I) services, Animal Health Services and Breed Improvement Programs.

Most of the Agricultural farmers are also involved in Dairy animal production and most of them are potential farmers since 30-40 years.

This write-up is an approach for encouraging the rearing of young buffalo heifers to adult and for increased milk production with the objective to compare the production cost of both 21 buffalo, heifers (Plan-A) or growing sustainability, giving birth, milk production potential with 21 adult milk buffaloes, kept at a farm for six years, or more.

MATERIAL AND MTHODS:

The following information, as per record, of the farms was taken, as baseline data and used for comparison.

i. Buffalo heifer (02 years old) in 2011, No.21.

ii. Dairy Animals (adult buffaloes) in 2011, Plan-B, No.21 with calves.

iii. Feed and fodder data on daily, weekly, monthly and yearly basis.

iv. Total yearly expenditure on (salaries, feed/fodder, shed equipment, operational cost, with animal health care services including utility bills etc).

v. Veterinary Medicines and vaccines used.

vi. Farm income both (i) Agricultural crops (wheat in Rabbi Season and Maize in Kharif season) and (ii) potatoes on two acres (16 kanals) of farm land.

RESULTS:

i. The data of initial expenditure for Plan-A and Plan-B was taken and summarized for comparison from first year i.e. 2011 through 2016 for six years, as presented in tables No.1 and No.2.

ii. Farm income data both from Dairy animals and agricultural produce was taken, summarized and presented in both tables No.1 and No.2.

iii. The buffalo heifers were impregnated in second year, at the farm when their age was in between 03 and 04 years.

iv. The buffalo heifers (21) became adult buffaloes, given birth to male/female calves and started producing milk.

v. On the other hand, the adult buffaloes, purchased as milch buffaloes with male/female calves (Plan-B) were producing milk, were impregnated in second year at the farm (when their age was on an average 5-6 years.

vi. The female buffalo calves were also impregnated in 3rd year (remained pregnant in forth year) and by the end of 4th year became adult buffaloes.

vii. At the 5th year at the farm (Plan-A) heifers grown to adult buffaloes were again ready to give birth while Plan-B, adult buffaloes were reducing milk production, and needed replacement, one after the other.

viii. The potential of adult buffaloes (milch buffaloes with buffalo calves) introduced to the farm, kept their potential upto the age of 8-10 years subject to the constants of breed, ample feed and fodder, animal health care and all Good Management Practices (GMPs) in vogue.

ix. On the other hand, buffalo heifers grown at the farm to adult

buffaloes showed greater potential and not replaced, can easily be maintained upto 10 years, subject to the same constants. Summary cost tabulated below:

Table No.01 showing the financial analysis of rearing 21,B. heifers to adult buffaloes for milk production Plan-A, at the agriculture and livestock farm (Million Rs.)

Sr.#	Year	Expenditure	Income	Saving
01	First 2011	3.15	0.56	NIL
02	Second 2012	1.62	0.58	NIL
03	Third 2013	1.62	0.58	NIL
04	Fourth 2014	2.01	4.65	1.03
05	Fifth 2015	3.62	7.44	3.82
06	Sixth 2016	3.66	8.25	5.37

Source: Agriculture and Livestock Farm.

Table No.02 showing the financial analysis of maintaining 21 Dairy buffaloes for milk production Plan-B, at the Agriculture and Livestock farm (Million Rs.)

Sr.#	Year	Expenditure	Income	Saving
01	First 2011	8.00	5.86	02.66
02	Second 2012	4.50	7.16	04.14
03	Third 2013	8.80	09.90	44.41
04	Fourth 2014	6.72	11.15	8.92
05	Fifth 2015	9.54	18.44	3.12
06	Sixth 2016	10.52	21.44	10.82

Source: Agriculture and Livestock Farm.

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NB: There are 4-5 Annexures of detailed expenditure, operational cost year wise and complete record (hard copies/registers) available with the author.

EFFICACY OF THREE INSECT DERIVED SEMIOCHEMICALS AGAINST *SITOBION AVENAE* AND *RHOPALOSIPHUM PADI* USING WHEAT CULTIVAR FAREED-06

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ABSTRACT

Most of the plants emit a broad spectrum volatile semiochemicals to repel insect pests and attract natural enemies. Therefore, the repellency effect of three insect derived semiochemicals was evaluated under controlled conditions. For this purpose, Wheat cultivar Fareed-06 was sown in pots in glasshouse (25 ± 2 °C) and 65% RH under an LD 16:8 h. Aphid species, *Sitobion avenae* and *Rhopalosiphum padi* were released on 6-week old plants. Two weeks later, 05 concentrations (0%, 0.5%, 1%, 2% and 3%) of three semiochemicals (*E*)-*β*-Farnesene, *β*-pinene and *α*-pinene were applied separately. Data pertaining to repellency of both aphid species after semiochemical application were analysed statistically and found that *β*-pinene exhibited highest mean repellency of *S. avenae* (83.84%) and *R. padi* (81.30%) as compared to two other insect derived semiochemicals.

Key words: Semiochemical repellency effect Wheat Cultivars Aphids Controlled conditions Pakistan

INTRODUCTION:

Aphids have wide host plant range and they transmit more than 100 viral diseases to host plants (Devi and Singh, 2007). The bird cherry-oat aphid, *Rhopalosiphum padi (R.Padi)* is a host-alternating aphid and moves between graminaceous summer hosts and the bird cherry tree, *Prunus padus* L., winter host (Park *et al.,* 2000). Aphid pests have a strong preference for wheat leaves and ears, and outbreaks often occur on winter wheat crops (Larsson, 2005). About 5,000 aphid species attack the agricultural crop plants with estimated losses at hundreds of millions of dollars per anum worldwide as reported by Morrison and Peairs (1998) Oerke (1994). With the passage of time, the indiscriminate and overuse of insecticides has increased the population trend and degree of resistance in aphids. It was found that only 1% of insecticide used reach the target pests, while 99% of these toxic compounds enter in our environment as put forward by Hassan (1992). When there is an increase in insecticide resistance, the overall effectiveness of insecticide use decreases as depicted by Roush and Tabashnik (1990). It was found that natural pesticides are safer to non target organisms and environment Debashri and Tamal (2012) and Bushra *et al.* (2014). Use of semiochemicals a potential strategy to reduce crop losses by aphid

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infestation Pickett *et al.* (1994) and Bushra and Tariq (2014) the chemical structure and function of aphid alarm pheromones was described first time in the world by Bowers *et al.* (1972).

BRIEF REVIEW:

Work done by researchers at home and abroad is summarized as under:

Aphid alarm pheromone consists *α*-pinene and *β*-pinene, E-*β*-Farnesene (EBF) and some other minor compounds. These compounds have the ability to attract various natural enemies as put forward by Leroy *et al.* (2012). Predatory beetles, *A. bipunctata* (Hemptinne *et al.,* 2000; Francis *et al.,* 2004), *H. convergens* (Acar *et al.,* 2001), and *C. septempunctata* (Nakamuta, 1991; Al Abassi *et al.,* 2000), orient itself towards EβF in the four-arm olfactometer bioassays as demonstrated and used by Osawa (2000). Alarm pheromone is secreted by aphids for their immediate dispersal duly reported by Birkett and Pickett (2003). Keeping in view the hazards of pesticides and benefits of aphid alarm pheromone, the efficacy of three semiochemicals against *Sitobion avenae* and *Rhopalosiphum padi* was tested in our environment.

Oerke (1994) reported that *S. avenae* and *R.padi* are severe pests of wheat. Dawson *et al.* (1982) found that alarm pheromone can easily be oxidized and is highly volatile. Chen *et al.* (2007) found that coexistence of *S. avenae* and *M. persicae* results significant damage and transmission of plant viruses. Wohlers (1982) found that (EβF) odour have a significant impact on aphid dispersal, wing-beat amplitude and population of *S. avenae* and *M. persicae*. Mondor and Roitberg (2003) reported that a single (EβF) droplet can disrupt life cycle, delay reproduction and reduce the number of offspring produced in pea aphid, *Acyrthosiphon pisum*. Shah *et al.* (1999) performed the bioassays to test the behavioural response of *Diuraphis noxia* towards synthetic (EβF) under controlled conditions. The EC_{50} value was found 0.94-8.95 mg/ml.

Petrescu *et al.* (2001) found that when *A. pisum* is attacked by a predator, it disperse its nearby aphids by releasing (EβF) at 38 ng/cm^3. Similarly, *A. pisum* injured plants also emit (EβF) at 0.8 ng/cm^3 to disperse them. Su *et al.* (2006) reported that synthetic (EβF) significantly affects the body weight, fecundity and development time in *Aphis gossipii*.

Verheggen *et al.* (2008) found that EβF released from *A. pisum* tends to disperse it from host plant and disrupt feeding among its colony members. Podjasek *et al.* (2005) performed the bioassay to test the response of *A. pisum* (E*β*F) at 5000ng. It was found that (E*β*F) is responsible for transgenerational wing polyphenism. The (E*β*F) induces *A. pisum* to reproduce off springs having 2.5, 5.0, and 6.0 times increased wing fold. It was found that (E*β*F) mediate wing induction which results reduced *A. pisum* population density in laboratory and field as well (Hatano *et al.,* 2010; Kunert *et al.,* 2005; Wohlers, 1981). Bruce *et al.* (2005) reported that *Hemizygia petiolata* plant essential oil contain (E*β*F) contents abundantly in it which can reduce *A. pisum* population in plants by application of slow release formulations.

Pickett and Griffith (1980) found that among monoterpenes, i.e. (*α*-pinene, *β*-pinene and *β*-limonene), *α*-pinene have highest alarm activity. Recently, Francis *et al.* (2005) tested the volatile emissions of 23 crushed aphid species and reported that (E*β*F) was major or a single, volatile compound released by 16 aphid species.

MATERIAL AND METHODS:

i. This experiment was conducted at Glass house of Pir Mehr Ali Shah (PMAS) Arid Agriculture University, Rawalpindi (AAUR) and comprised of five treatments with five replications and used in this study.

ii. Two Wheat cultivars namely Fareed-06 and Uqab-2000 were collected from NARC Islamabad.

iii. Two aphid species, namely *Sitobion Avenae (S.Avenae)* and *Rhopalosiphum padi(R.Padi)* were used in this experiment.

iv. Wheat variety (Uqab-2000) seeds were sown in 50 pots. Natural environmental conditions were provided to them.

v. Aphid culture of *Sitobion avenae* and *(R.Padi)* was collected from Koont Research Farm and naturally infested field area of PMAS, AAUR. The collected aphid culture was maintained in Wheat variety (Uqab-2000).

vi. The efficacy of plant extracts was tested on collected aphid culture.

vii. Semiochemicals, *α*-pinene and E-*β*-Farnesene (E*β*F) were obtained from Aldrich and *β*-pinene was obtained from Merck. All semiochemicals were 98% pure.

viii. A solution of each semiochemical was prepared in n-hexane with five different concentrations (0 *m*l/100 ml, 0.5 ml/100 ml, 1 ml/100 ml, 2 ml/100 ml and 3 ml/100 ml) respectively and preserved, until used.

ix. ***Application of α-pinene, β-pinene and EβF on Sitobion avenae and R. padi***
Wheat seeds of variety (Fareed-06) were sown in 25 pots having 15 cm diameter. About   20 seeds per pot were sown in glass house under controlled conditions (25 ± 2 °C) and 65% RH under an LD 16:8 h. Seeds germinated within 4-6 days of sowing. After 6 weeks of germination the wheat plants were subjected to aphid culture of *S. avenae*. About twenty aphids, per pot, were released. These plants were covered with ventilated polythene sheets to avoid accidental aphid infestation and escape of applied culture. Two weeks later, hundred aphids per pot were left behind and rest of them were removed via camel hair brush. Semiochemicals, α-pinene, β-pinene and EPF formulations were applied to these plants in five concentrations. Semiochemicals were applied by method described by Sun *et al.* (2010). The solution of (EBF/n-hexane) was added by a micropipette to filter paper disc (3 cm×3 cm) at the base in center of each pot. The pots were again covered by polythene sheets so that semiochemical could easily be oxidized inside it. Aphid repellency data was collected after 24 and 48 hrs of α-pinene, β-pinene and EβF applications.

Percent repellency of *S.avenae* after α-pinene, β-pinene and EβF application was calculated by formula described by Pavela *et al.* (2009).

Percent repellency of *S.avenae* after 24 and 48 hrs of α-pinene, β-pinene and EβF application PR (%) = [(C-T)/(C+T)] x1 00

Where: C= total number of aphids in untreated control, and T= total number of aphids on semiochemical treated plants.

vii. **Statistical Analysi**

The data regarding aphid repellency were subjected to statistical programme R 2.15.2   R Development Core Team (2013) to determine Analysis of Variance (ANOVA). The repellency data was subjected to HSD test at 0.05% level of significance to compare the differences between the means.

RESULTS:

i.   **Analysis of variance for repellency of *S.avenae* and *P. padi* after 24 hrs of semiochemical application.**

The ANOVA result is presented in (Table 1) which revealed highly significant differences among both aphid species and plant extracts and exhibited a significant effect on semiochemicals, concentrations and repellency of aphid species in 24 hrs (F = 1.969, df = 8, P < 0.1). A highly significant effect was found between semiochemicals and concentrations on aphid repellency in 24 hrs (F = 167.348, df = 8, P < 0.001). Similarly, a highly significant effect was found between aphid species and concentrations on aphid repellency in 24 hrs (F = 5.883, df = 4, P < 0.001). A highly significant effect was observed between aphid species and semiochemicals on aphid repellency in 24 hrs (F = 0.391, df = 2, P < 0.001). The semiochemical concentrations have highly significant effect on aphid repellency in 24 hrs (F = 4443.002, df = 4, P < 0.001). The semiochemicals have highly significant effect on aphid repellency in 24 hrs (F = 542.819, df = 2, P < 0.001). A non significant effect of aphid species was found on aphid repellency in 24 hrs (F = 0.517, df = 1, P < 1).

Yet in next observations a significant effect was found on repellency of aphid species, semiochemicals and concentrations in 48 hrs (F = 0.901, df = 8, P < 0.1). A highly significant effect was found between semiochemicals and concentrations on aphid repellency in 48 hrs (F = 130.968, df = 8, P < 0.001). A highly significant effect was found between aphid species and concentrations on aphid repellency in 48 hrs (F = 0.981, df = 4, P < 0.001). Similarly, a highly significant effect was observed between aphid species and semiochemicals on aphid mortality in 48 hrs (F = 0.378, df = 2, P < 0.001). The semiochemical concentrations have highly significant effect on aphid repellency in 48 hrs (F = 2268.90, df = 4, P < 0.001). A significant effect of semiochemical was found on

aphid repellency in 48 hrs (F = 388.855, df = 2, P < 0.001). A non significant effect of aphid species was observed on aphid repellency in 48 hrs (F = 1.187, df = 1, P < 1) as presented in table No.01 below:

Table No. 1 Showing Analysis of variance repellency of *S. avenae* and *R. padi* after 24 and 48 hrs of semiochemical application.

Source of Variation	Df	F-value	
		Aphid repellency in 24 hrs	Aphid repellency in 48 hrs
Aphid Species (A)	1	0.517	1.187
Semiochemicals (B)	2	542.819***	388.855***
Concentrations (C)	4	4443.002***	2268.90***
A × B	2	0.391***	0.378***
A × C	4	5.883***	0.981***
B × C	8	167.348***	130.968***
A × B × C	8	1.969·	0.901·
Residuals	120		

*** P<0.001, ** P<0.01, * P<0.05, · P< 0.1 and P<1
Source: Ph.D. Thesis of the principal author.

ii.   Aphid repellency after *α*-pinene application

The comparison of means of aphid mortality at 5% level of probability shown in (Table 2), revealed that *S. avenae* exhibited minimum mean repellency, i.e. aphid population was (96.80%) and (94.80%) after 24 and 48hrs of *α*-pinene application in untreated controls. The population of *S. avenae* was found (79.40%) and (71.40%) after 24 and 48 hrs of *α*-pinene application at 0.5% concentration respectively. The population of *S. avenae* was increased to (55.20%) and (49.40%) after 24 and 48 hrs of *α*-pinene application at 1% concentration respectively. The population of *S. avenae* was found (40.08%) and (32.30%) after 24 and 48 hrs of *α*-pinene application at 2% concentration respectively. The population of *S. avenae* was found (25.80%) and (21.60%) after 24 and 48 hrs of *α*-pinene application at 3% concentration respectively. The overall population of *S. avenae* ranged from (96.80%) to (25.80%) after 24 hrs of *α*-pinene application. While, the overall population of *S. avenae* ranged from (94.80%) to (21.60%) after 48 hrs of *α*-pinene application as presented in Table 2 below:-

It was found that *R. padi* exhibited minimum mean repellency, i.e. aphid population was (95.80%) and (95.60%) after 24 and 48hrs of *α*-pinene application in untreated controls. The population of *R. padi* was found (79.0%) and (70.80%) after 24 and 48 hrs of *α*-pinene application at 0.5% concentration respectively. The population of *R. padi* was increased to (55.20%) and (49.40%) after 24 and 48 hrs

of *α*-pinene application at 1% concentration respectively. The population of *R. padi* was found (40.0%) and (31.40%) after 24 and 48 hrs of *α*-pinene application at 2% concentration respectively. The population of *R. padi* was found (26.60%) and (22.40%) after 24 and 48 hrs of *α*-pinene application at 3% concentration respectively. The overall population of *R. padi* was ranged from (95.80%) to (26.60%) after 24 hrs of *α*-pinene application. While, the overall population of *R. padi* was ranged from (95.60%) to (22.40%) after 48 hrs of *α*-pinene application as appears in the same Table 2:

Table No. 2 showing the means ± SEM of data regarding repellency of *R. avenae* and *R.padi* after 24 and 48 hrs of *α*-pinene application.

α-pinen	*Sitobion avenae*		Mean% repellency		*Rhopalosiphum padi*		Mean% repellency	
	24 hrs	48 hrs	24 hrs	48 hrs	24 hrs	48 hrs	24 hrs	48 hrs
Control	96.80 ± 0.49	94.80 ± 0.37	-	-	95.80 ± 0.49	95.60 ± 0.51	-	-
0.5	79.40 ± 0.4	71.40 ± 0.87	9.88	14.09	79.0 ± 0.44	70.80 ± 0.73	9.61	14.91
1	55.20 ± 0.58	49.40 ± 0.6	27.37	31.49	55.20 ± 0.37	49.40 ± 0.68	26.89	31.87
2	40.08 ± 0.54	32.30 ± 0.68	41.52	49.08	40.0 ± 0.84	31.40 ± 1.08	41.11	50.58
3	25.80 ± 0.37	21.60 ± 0.68	57.92	62.91	26.60 ± 1.21	22.40 ± 0.87	56.61	62.08

iii. Aphid Repellency after *β*-pinene application

It was found that *S.avenae* exhibited minimum mean repellency, i.e. aphid population was (95.40%) after 24 and 48hrs of *β*-pinene application in untreated controls. The population of *S. avenae* was found (66.80%) and (62.80%) after 24 and 48 hrs of *β*-pinene application at 0.5% concentration respectively. The population of *S. avenae* was increased to (55.0%) and (39.60%) after 24 and 48 hrs of *β*-pinene application at 1% concentration respectively. The mean population of *S. avenae* was found (27.20%) and (22.0%) after 24 and 48 hrs of *β*-pinene application at 2% concentration respectively. The population of *S. avenae* was found (8.40%) and (5.20%) after 24 and 48 hrs of *β*-pinene application at 3% concentration respectively. The overall mean repellency of *S. avenae* was ranged from (95.40%) to (8.40%) after 24 hrs of *β*-pinene application. While, the overall mean repellency of *S. avenae* was ranged from (95.40%) to (5.20%) after 48 hrs of *α*-pinene application (Table 3).

It was found that *R. padi* exhibited minimum mean repellency, i.e. aphid population was (95.40%) and (95.0%) after 24 and 48hrs of *β*-pinene application in untreated controls. The population of *R. padi* was found (63.40%) and (63.20%) after 24 and 48 hrs of *β*-pinene application at 0.5% concentration respectively. The

population of *R. padi* increased to (54.60%) and (38.80%) after 24 and 48 hrs of *β*-pinene application at 1% concentration respectively. The population of *R. padi* was found as (24.20%) and (21.80%) after 24 and 48 hrs of *β*-pinene application at 2% concentration respectively. The population of *R. padi* was found (9.12%) and (6.40%) after 24 and 48 hrs of *β*-pinene application at 3% concentration respectively. The overall mean repellency of *R. padi* was ranged from (95.40%) to (9.12%) after 24 hrs of *β*-pinene application. While, the overall mean repellency of *R. padi* was ranged from (95.0%) to (6.40%) after 48 hrs of *β*-pinene application as presented in the same Table 3 below:

Table 3 showing the means ± SEM of data regarding repellency of *S. avenae* and R. Padi after 24 and 48 hrs of *β*-pinene application.

β-pinene	*Sitobion avenae*		Mean% repellency		*Rhopalosiphum padi*		Mean% repellency	
	24 hrs	48 hrs	24 hrs	48 hrs	24 hrs	48 hrs	24 hrs	48 hrs
Control	95.40 ± 0.24	95.40 ± 0.51	-	-	95.40 ± 0.24	95.0 ± 0.32	-	-
0.5	66.80 ± 0.49	62.80 ± 0.73	17.64	20.62	63.40 ± 0.68	63.20 ± 0.37	20.16	20.10
1	55.0 ± 0.32	39.60 ± 0.51	26.86	41.34	54.60 ± 0.81	38.80 ± 0.97	27.22	42.04
2	27.20 ± 1.16	22.0 ± 0.84	55.68	62.55	24.20 ± 0.80	21.80 ± 0.58	59.56	62.69
3	8.40 ± 0.51	5.20 ± 0.49	83.84	89.69	9.12 ± 0.66	6.40 ± 0.92	81.30	87.44

iv. Aphid Repellency after E-*β*-Farnesene application

It was found that *S.avenae* exhibited minimum mean repellency, i.e. aphid population was (95.40%) and (95.80%) after 24 and 48hrs of (E*β*F) application in untreated controls. The population of *S. avenae* was found as (79.40%) and (73.40%) after 24 and 48 hrs of (E*β*F) application at 0.5% concentration respectively. The population of *S. avenae* increased to (58.20%) and (48.20%) after 24 and 48 hrs of (E*β*F) application at 1% concentration respectively. The population of *S. avenae* was found as (38.80%) and (30.80%) after 24 and 48 hrs of (E*β*F) application at 2% concentration respectively. The population of *S. avenae* was found (20.80%) and (22.20%) after 24 and 48 hrs of (E*β*F) application at 3% concentration respectively. The overall mean repellency of *S. avenae* ranged from (95.40%) to (20.80%) after 24 hrs of (E*β*F) application. While, the overall mean repellency of *S. avenae* ranged from (95.80%) to (22.20%) after 48 hrs of (E*β*F) application as presented in Table 4 below:

It was found that *R. padi* exhibited minimum mean repellency, i.e. aphid population was (95.0%) and (96.40%) after 24 and 48hrs of (E*β*F) application in untreated controls. The population of *R. padi* was found as (78.0%) and (72.60%)

after 24 and 48 hrs of (E*β*F) application at 0.5% concentration respectively. The population of *R. padi* increased to (59.40%) and (49.40%) after 24 and 48 hrs of (E*β*F) application at 1% concentration respectively. The population of *R. padi* was found as (35.0%) and (32.60%) after 24 and 48 hrs of (E*β*F) application at 2% concentration respectively. The population of *R. padi* was found as (21.20%) and (22.20%) after 24 and 48 hrs of (E*β*F) application at 3% concentration respectively. The overall mean repellency of *R. padi* ranged from (95.0%) to (21.20%) after 24 hrs of (E*β*F) application. While, the overall mean repellency of *R. padi* ranged from (96.40%) to (22.20%) after 48 hrs of (E*β*F) application appearing in the same Table 4 below:

Table No.4 showing the means ± SEM of data regarding repellency of *S. avenae* and *R. Padi* after 24 and 48 hrs of E-*β*-Farnesene (E*β*F) application.

E*β*F	*Sitobion avenae*		Mean% repellency		*Rhopalosiphum padi*		Mean% repellency	
	24 hrs	48 hrs	24 hrs	48 hrs	24 hrs	48 hrs	24 hrs	48 hrs
Control	95.40 ± 0.06	95.80 ± 0.54	-	-	95.0 ± 0.32	96.40 ± 0.4	-	-
0.5	79.40 ± 0.66	73.40 ± 0.26	9.16	13.24	78.0 ± 0.32	72.60 ± 0.51	9.82	14.08
1	58.20 ± 0.84	48.20 ± 0.44	24.24	30.06	59.40 ± 0.24	49.40 ± 0.68	23.06	32.24
2	38.80 ± 0.34	30.80 ± 1.24	42.18	51.38	35.0 ± 0.32	32.60 ± 0.93	49.16	49.49
3	20.80 ± 0.54	22.20 ± 1.04	64.22	62.41	21.20 ± 1.07	22.20 ± 1.16	63.17	62.62

Our results indicated that among three applied semiochemicals, *β*-pinene is most effective to repel both aphid species. The overall mean repellency of *S. avenae* ranged from (95.40%) to (8.40%) after 24 hrs of *β*-pinene application. While, the overall mean mortality of *S. avenae* ranged from 4.48% to 94.64% after 48 hrs of *α*-pinene application. The overall mean repellency of *R. padi* ranged from 95.40% to 9.12% after 24 hrs of *β*-pinene application. The overall mean repellency of *R. padi* ranged from 95.0% to 6.40% after 48 hrs of *β*-pinene application.

CONCLUSION AND RECOMMENDATION:

(i)   The release of aphid alarm pheromone within the colony increases the frequency of physical contact which results in reproduction of winged dispersing morphs.

(ii)   It was found that the insect infested plants release volatile compounds containing alarm pheromone. These volatile compounds repel *Rhopalosiphon maidis*.

(iii)   We can reduce the application of chemical pesticides to control aphid pests by the consumption of compounds of natural origin.

(iv)   For this reason, the application of plant derived compounds is being increased from recent decades.

(v)   Further studies can be continued on these lines.

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SUSTAINABLE TREND OF INFLUX OF MATRIC AND FA STUDENTS IN AGRICULTURE AND LIVESTOCK SUBJECTS IN SPRING AND AUTUMN-2015 SEMESTERS OF AIOU, ISLAMABAD

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ABSTRACT

This research cum investigative article describes the number of students enrolled in Agriculture as well as Livestock course codes 211, 253, 254, 256 and 257 of Matric while course codes 313, 326, 327, 328, 342 and 349 of FA level, during 2013-14 and 2015 both semesters namely Spring and Autumn, respectively. The recent cooperative trend is encouraging agricultural courses of Spring-2015 Semester were compared with Autumn 2015. The total number of answer scripts (papers) of courses have also increased from 10046 out of 37 bundles in Spring-2015 to 11,454 out of 62 bundles. The work of Spring 2015 was performed in December 2015 and January 2016 while the Autumn 2015 paper evaluation was carried out in July-August 2016 respectively. This article also includes discussions, recommends proposed increases in single answer scripts fourth-with at Matric and FA levels as well, which is the verbal demand of many sub examiners (SEs) and Head Examiner (H/Es) including the assistants to H/Es of majority of panels of AIOU, paper evaluation. .

Key words: AIOU, paper evaluation, sustainable trend agriculture and livestock courses Matric, FA.

INTRODUCTION:

The Agriculture and Livestock Panel is entrusted to evaluate Matric and FA Final Examination papers (scripts) of various codes, each semester. This research article comprises comparative status of two semesters the Spring and Autumn 2015. This work was done in December/January 2015-16 for Spring-2045 and in July-August 2016 for Autumn 2015 semester, respectively. This group has always presented the work done since 2010 and such documented matter was then published in Pakistan Journal of Livestock Sciences (Pak.JLSc.) in 2013, 2014 (Khizar Hayat et.al (2014) and Muhammad Hafeez et.al (2015).

Some of the courses introduced recently such as 253 and 254 of Matric level in basic livestock sciences are being enrolled in a normal expected way but the courses introduced in basic agricultural sciences namely 256 and 257 have shown increasing interest of enrolment in the Spring and Autumn 2015. A detailed picture of these courses enrolment, and script evaluated is also summarized in table No.01, 02 and 03 of this presentation.

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This endeavor is made to provide our readers with the recent status of enrolment and an overall picture of Matric and FA courses enrolled by students, as evaluated by the Agriculture panel in both Autumn and Spring Semester, for the reported years.

It is worth mentioning that the paper evaluation work is limited to those students only who enrolled these course codes but simultaneously appeared in the examination.

The data of absentees is not included in this presentation. As it has been observed and noted at the time of computer listing of students when double checked/cross examined, the entries made, there appeared upto 40-50 students on the average recorded as absent/not appeared in final examination of any semester or any course code.

MATERIAL AND MTHODS:

For the preparing of this article the following factual record was excessively consulted:-

i. The paper evaluation distribution forms of each Sub. Examiner (S/E) of agriculture panel of AIOU, Islamabad, duly signed by Head Examiner (H/E) and the Assistant to H/E.

ii. The script confirmation forms, double checked in computer section of the Secrecy of AIOU, Islamabad.

iii. Remuneration bill proformas of each SE, HE and Assistant to H/E after completion of the task, each semester.

iv. The HE's complete record of the total quantum of work done, each semester.

RESULTS:

The data thus obtained (Primary data), has been presented in tabulated form below, after summation and comparison:

Table No.01 showing quantum of work Matric and FA paper evaluation of agriculture and Livestock courses of Spring and Autumn Semesters – 2015 at AIOU, Islamabad.

A-Matric	Spring-2015			Autumn-2015		
Sr.#	Code	Bundle	Total Scripts	Code	Bundle	Total Scripts
01	211	01	375	211	02	360
02	253	01	321	253	02	260
03	254	01	326	254	03	262
04	256	06	1885	256	08	200
05	257	05	1601	257	13	2594
Sub Total	05	14	4508	05	28	5476

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B-FA						
01	313	03	970	313	05	880
02	326	04	1041	326	04	564
03	237	04	1078	327	05	778
04	238	04	1014	328	04	737
05	329	03	947	329	06	973
06	342	06	927	342	06	945
07	349	02	561	349	04	1051
Sub Total	**07**	**23**	**23**	**07**	**34**	**5978**
Grand Total	**12**	**37**	**10,046**	**12**	**62**	**11,454**

Source: Matric-FA paper evaluation, Spring-Autumn2015, AIOU, Islamabad.

Panel Code/Group ID each semester, a new panel (may be already working or the available examiner) is approved by the Assistant Controller of Examination (ACE), and this approved panel with a new group-ID performs the paper evaluation work of their subject specialty such as English, Islamiyat, Pak. Studies, Mass. Com, Arabic, Biology, Math, Stat, Computer Sciences and ours as Agriculture and Livestock. Our group IDs continued work was performed w.e.f. 2010 Spring to Autumn 2015 were 1131, 1240, 1415, 1561, 1800, 1998, 2131, 2279, 2731 and 2870 respectively.

Table No.03 showing total quantum of paper evaluation by each sub-examiner in the Spring and Autumn Semester 2015 at AIOU, Islamabad.

Sr.#	Name of Sub and Head Examiner	ID	Spring-2015	Autumn-2015
01	Iram Shahzadi (S/E)	379	2690	1404
02	Dr. Muhammad Hafeez (H/E)	0413	2690	1404
03	Quratal Ain (S/E)	2053	2690	3300
04	Bushara Tabassum (S/E)	2575	1795	1427
05	Bushara Siddique (S/E)	2474	1084	1785
06	Saima Bibi (S/E)	2305	1016	754
07	Najeeb Ullah (S/E)	2593	1843	1221
08	M. Kaleemullah (S/E)	1282	1843	634
09	M. Ibrahim (S/E)	0456	56	441
10	Dr. Khizar Hayat (S/E)	496	596	127
11	Sara Sidiq (S/E)	2943	596	67
12	Bilal Mansoor (S/E)	1492	1334	67
13	Memona Khan (S/E)	424	23	107
14	Dr. Sajida Tufail (S/E)	1679	100	107
15	Additional Self marking		11267	11314

Source: H/E's record of Agriculture and Livestock Panel, AIOU, Islamabad.

Although there appeared a little decrease of scripts evaluated in FA curses codes 313, 326, 327 and 328 when compared Spring-2015 (totaling 970, 1044, 1078 and 1014 respectively) and with Autumn Semester-2015 (totaling 880, 564, 778 and 737 respectively) for these courses, as already documented in Pak.JLSc Vol-IV, No.04 and Vol-II, No.03 in 2013-14 and 2012-13. In majority of courses not

only in Matric course codes 256 and 257 but also in FA course codes 329, 342 and 349 an increasing trend has been recorded (Table No.02). When compared, the total number of papers (11464) evaluated in Autumn 2015 showed an increase of 1408 over the last semester i.e. Spring-2015 (10,046) with a percentage of 14.015%.

Table No.02 showing the Semester wise and year wise paper evaluation work carried out by agriculture and livestock panel at AIOU, Islamabad 2013 through 2015 (Both semesters)

FA Codes	Spring-2013		Autumn-2013		Spring-2014		Autumn-2014		Spring-2015		Autumn-2015	
	(B)	(T)	(B)	(T)	(B)	(T)	(B)	(T)	(B)	(T)	(B)	(T)
313	03	624	06	1110	02	254	02	569	03	970	05	880
326	03	598	05	1079	02	500	02	546	04	1041	04	564
327	02	561	03	809	01	381	02	131	04	1078	05	778
328	02	431	05	1036	04	997	05	1243	04	1014	04	737
329	04	872	03	467	03	655	04	1181	03	947	06	973
342	04	1007	04	970	04	1138	06	1239	03	927	06	995
349	06	1567	05	1277	11	3218	12	3250	02	561	04	1051
Sub total	**24**	**5660**	**31**	**6748**	**27**	**7133**	**33**	**8078**	**23**	**6538**	**34**	**5978**

Matric Codes	Spring - 2013		Autumn - 2014		Spring-2015		Autumn - 2015	
	(B)	(T)	(B)	(T)	(B)	(T)	(B)	(T)
211	02	438	02	413	01	375	02	360
253	01	246	01	229	01	321	02	260
257	01	239	01	238	01	326	03	253
256	07	1868	03	881	06	1885	08	2000
257	02	534	02	579	05	1601	13	2594
Sub total	**13**	**3325**	**09**	**2340**	**14**	**4508**	**28**	**5467**
Grand Total							**11,454**	

B-Number of bundles   T-Total Scripts evaluated in bundles

Source: Head Examiner paper evaluation panel/group of Agriculture and Livestock, AIOU, ISBD.

CONCLUSION:

Although the Livestock course codes 211 (Poultry Science), 253 (basic Livestock production) and 254 (Basic Livestock Management) while Agriculture course codes, 256 (Vegetable production) and 257 (fruit production) at Matric level are not compulsory courses but their enrolment indicates the interest of students. Similarly FA Courses (313 Dairy Farming) and course codes 326, 327, 328, 329, 342 and 349 are also not compulsory courses, these are optional and totally at the discretion of students for enrolment, and an increase in semester after semester shows the real interest of students. The sustainability in enrolment and appearing in Final examination shows the increasing interest of the students and/or the liking of these subjects by the new students (both male and female) who have a family background of Agriculture and Livestock farming, as well as student to student contact for these courses of AIOU.

RECOMMENDATIONS:

i.   These subject course codes need to be updated as there are informations which are more than a decade old and must be upgraded and revised, forthwith.

ii. There is a dire need of introduction of Poultry Sciences courses, at FA level for which efforts are already in hand. An efforts in already being done at FA level diploma course for Poultry Assistants, the course books of which are being written and are in the process of editing and printing by the Department of Agriculture Sciences AIOU (M.Hafeez – 2016).

iii. Remuneration of Rs.13/- per script evaluation of Matric level and R.s14/- FA level (script evaluation) is far less as compared to Federal Board of Intermediate and Secondary Education (FBISE), Islamabad as well as Rawalpindi Board of Intermediate and Secondary Education (RBISE) where the Matric paper evaluation remuneration is Rs.25/- and Rs.26/- respectively, while, FA/FSc. rates are Rs.38/- in FBISE, Islamabad and RBISE since 2010-2011.

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EFFECTS OF FIRE ON FLORAL DIVERSITY AND ITS PREVENTIVE MEASURES ON MARGALLA HILLS ISLAMABAD

Muhammad Ibraheem* and Aamir Saleem**

ABSTRACT

Forest fire is an important component in the development and sustainability of many forest ecosystems. With regard to environment, the forest fire alters the soil physical, chemical, biological properties and influencing vegetation pattern. Information available on the nature and magnitude of changes brought out by forest fire on floral diversity under margalla hills Islamabad is scanty. Keeping these in view, the present study was carried out in Talhar are situated in Margalla hills Islamabad Pakistan to evaluate the effect of forest fire on floral diversity, and preventive measures at two adjacent burnt and unburnt sites. The effects of forest fire on vegetation composition were studied using quadrate method by simple random sampling. The results were analyzed by using vegetational parameters and biodiversity indices. The study showed that the fire had severely affected the tree components in the vegetation when compared to herbs and shrubs. The research results also revealed that regeneration of herbs and shrubs occurred in the burnt area after fire season. The vegetation was already degraded because of regular occurrence of fire seriously damaging the vegetational composition enabling further degradation of the vegetation. Low biodiversity index in burnt area showed that forest fire had significant effect on the plant distribution and vegetation composition had under serious threat of degradation. Further, numerous physical and climatic factors (e.g., fuel condition, weather and as well as biological factors (plant morphology and physiology) was also influenced by post-fire effects on plant communities. Direct effected such as the ability of individual species to resist the heat of fire (depending on age and seasonality) and the mechanisms by which they recover after fire. A good management plan for fire management (which will help to regain the vegetation through retrogression) has been recommended.

Key words: Fire Effects, Forestry, Margalla Hills, Islamabad Pakistan.

INTRODUCTION:

Fires have influenced the characteristic of the forest ecosystem throughout the world. In fact, many forest communities over the world persist only under the influence of periodic wildfires, which cause ecological, social and economic damages to a greater extent. In tropical regions, wildfires are common in dry environment season and rare in perennially moist areas. Even the wettest tropical rain forests may burn at a time scale of thousands of years and the annual extent of fire may be greater in tropical and sub-tropical regions than in the rest of the world .On the basis of the place of their action, forest fires are classified into four types namely (i) creeping fire, (ii) ground fire, (iii) surface fire, and (iv) crown fire, among which, ground fire influences soil properties to the maximum, Franklin et.al (2006). It burns the ground cover only, the carpet of herbaceous plants and low

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shrubs, (which covers the soil). In other words, it refers to any fire that consumes the organic material of the forest floor and also burns into the underlying soil itself. Repeated low-intensity fires may shape the forest by killing small trees, rejuvenating fire-tolerant grasses and accelerating the cycling of nutrients. High-intensity fires kill the majority of trees, oxidize large quantities of nutrients such as nitrogen and disturb soil plant interactions for decades. This great pressure on forest fire has resulted in biodiversity disturbing the eco-system dynamics. (Saravanan V *et al* 2014).

Forest fires have many implications for biological diversity. At the global scale, they are significant sources of emitted carbon, contributing to global warming which could lead to biodiversity changes. At the regional and local level, they lead to change in biomass Stocks, alter the hydrological cycle with subsequent effects for marine systems such as coral reefs, and impact plant and animal species functioning. Smoke from fires can significantly reduce photosynthetic activity (Davies and Unam, 1999) and can be detrimental to health of humans and animals.

Fire is a vital and natural part of the functioning of numerous forest ecosystems. Humans have used fire for thousands of years as a land management tool. Fire is one of the natural forces that have influenced plant communities over time and as a natural process it serves an important function in maintaining the health of certain ecosystems. However, in the later part of the twentieth century, changes in the human-fire dynamic and an increase in El Niño frequency have led to a situation where fires are now a major threat to many forests and the biodiversity therein. Tropical rain forests and cloud forests, which typically do not burn on a large scale, were devastated by wildfires during the 1980s and 1990s (FAO, 2001). Fire has long been integral part of the forest environment and has played an important role in shaping the flora and fauna. Forest may be either beneficial or detrimental to individuals of a particular species but the effect of a single fire is not as environmentally significant as a change to the fire regime (Smith, 1995).

Fire is an important disturbance agent in the landscape of a forest and plays an important role in the function and structure of forests. Fire, a historically

large and severe fire used to determine patterns of tree mortality and vegetation recovery. All plant functional group including exotic annual grasses increased in abundance after fire. As forest succession is a long term process, it is important to continue monitoring vegetation recovery. (Franklin, 2006). Vegetation fires are considered natural phenomena in many parts of the world and have shaped the landscape for millennia across entire continents. Fire is hence an important determinant of plant diversity and vegetation structure in regions where it occurs.

As anthropogenic burning has become predominant, the ecological impact of certain fire regimes is the subject of intense discussions. Nevertheless, relatively few studies have tried to identify the effects of certain fire regimes on vegetation and many of these studies show conflicting results because of the variety of the investigated vegetation types and fire regimes. Therefore, given the interaction between people, fire and vegetation in most parts of the world, studies considering local fire regimes on certain vegetation types require to fully understanding the ecological implications of a specific burning regime (Uys et al., 2004).

Study Area and Location: The present study was carried out in Talhar area Magralla Hills National Park, Islamabad to investigate the effects of forest fire on vegetation status of the fire affected area. The details of field studies which were conducted and methods followed.

The Margallah Hills National Park (MHNP) located in the Islamabad Capital Territory (ICT) forms the northern boundary of Islamabad, (the capital city of Pakistan). The area of park lies between geographical coordinates:33º36' to 36º33' N latitude 72º50' to 73 º 26' E longitudes. The park has approximately 17,386 ha (67.13 sq.miles) area in size, which comprises of different compartments, Margalla Reserve Forest and 1 to 25 of the Military Grass Farms (WWF Pakistan, 2009). The hill range nestle between and elevation of 685 meters at the western end and 1604 metes on its east. It consists of ridges, hillocks and pastures. Margalla Hills also cover an area of 12802 ha, Rawal Lake 1702 ha and Shaker Parian 1376 ha. Since its establishment the park is under the control of Capital Development Authority (CDA) vide notification number 443[1] / 80 (Anwar,

2000). The Northern part of the Margalla Hills National Park follows the Haripur – Islamabad and Rawalpindi-Islamabad district boundaries while the forest compartments periphery of 37 Reserve forest (RF) and 41 RF are followed by the Western part of the Park boundary. Southern side of the boundary moves with the forest compartments borders, existing boundary pillars, Siachen and Margalla road and also the center line of the nullahs (Rumli, Mandla and so on) and the Eastern part of the Park boundary follows the forest compartment boundary along with Rawalpindi-Islamabad district boundary. Finally the boundary of Rawal Lake follows the Kashmir Highway, Murree road, Shakar Parian, highest water mark of Rawal Lake along with 2 kilometers (km) buffer zone and CDA pillars at some places (WWF Pakistan, 2009).

Vegetation: The area represents the sub- tropical broad leaved evergreen forest type. It includes about 608 species of plants, belonging to 101 families and 548 genera (Mohammad 1990). The dominant species include: Kao (*Olea cuspidata*), Phulai (*Acacia modesta*), Bhaikar (*Adhatoda vasica*), Granda (*Carissa opaca*), Sunatha (*Dodonaea viscosa*), Chir pine (*Pinus roxburghii*), Oak (*Quercus incana*), Batangi (*Pyrus pashia*), Kikar (*Acacia nilotica*) and Ber (*Zizyphus mauritiana*). The vegetation above 1000 meters elevation falls in sub- tropical Chir-pine zone and consists of pure stands of Chir pine (*Pinus roxburghii*). In some areas of the park the vegetation is dominated by species like, Lantana (*Lantana camara*) and paper mulberry (*Broussonettia papyrifera*).

MATERIAL AND METHODS:

The current study involves the vegetation analysis in the forest fire affected and unaffected areas of Magralla Hills Islamabad Pakistan.

Assessment of floral diversity: The vegetation analysis was carried out unburnt and burnt areas of Margalla Hills Islamabad Pakistan. Two adjacent sites were selected for this study.

(i) One of the selected sites which was burnt recently i.e. in May-June 2014 by forest fire.

(ii) Other site was selected where no incidence of forest fire had occurred, at least for the last 05 years.

(iii)   In each site 15 transect lines spaced at equal-distance (50 m) were laid out.

(iv)   On each transect line, five quadrates of 10×10 m size for trees/ shrubs and 1×1 m for grasses/herbs spaced at uniform distance were laid down.

(v)   In each quadrate tree/shrubs and herbs/grasses frequency were calculated for cover % and density of each species, and number of plant of each species were studied.

(vi)   Different sampling sites were marked at different elevation. The quantitative data of vegetation like density, frequency and cover were recorded. Different altitudes were also recorded using Geographical Position System (GPS).

The following parameters were assessed:-

Floral diversity assessment was done using standard method established by Daniels *et al* (1996). In the study site random sampling method was followed in laying the sample plots. In order to determine the quantitative relationship between the plants species, the following parameters was determined.

(a)   **Species Density** was determined by taking total number of individual plants of a given species in a selected area divided by total number of Quadrate. The following formulas were used to calculate density:

$$\text{Density (D)} = \frac{\text{Total number of all individual of all species}}{\text{Total number of Quadrate}}$$

(b)   **The Relative Density** being the proportion of a density of a specy to that of a stand, as a whole was obtained by using the following formula:-

$$\text{Relative density (RD)} = \frac{\text{Total number of individuals of a specy}}{\text{Total number of individuals of all species}} \times 100$$

(c)   **The Species cover** being the length and width of the crown of species, was measured expressed as fraction or percent of a surface area was determined by the following formula.

$$\text{Percent Cover \% (C)} = \frac{\text{Area covered by a particular species}}{\text{Total area covered by all species}} \times 100$$

(d) **The Relative Cover** of a species being the proportion of the total cover of a species to the sum of the cover of all species in the selected area, was obtained by using following the formula:

$$\text{Relative cover (RC)} = \frac{\text{Total basal area of a species}}{\text{Total basal area of all species}}$$

(e) **Species frequency** being the percentage of sampling quadrates in which a given specy occurs was obtained with the following formula, to determine the frequency.

$$\text{Frequency \% (F)} = \frac{\text{Number of sample quadrate in which a specy occurs}}{\text{Total number of sample quadrate}} \times 100$$

(f) **Relative Frequency** being the proportion of the total frequency (of a specy) to the sum of the frequency of all the species in the area, it was determined by the following formula:-

$$\text{Relative frequency (RF)} = \frac{\text{Frequency of a Species}}{\text{Sum of frequencies of all species}} \times 100$$

(g) **Important Value** was worked out by adding RD, RF and RC using the following method:-

Important value = Relative density + Relative frequency + Relative cover
(IV = RD + RF + RC)

(h) **Important value index (IVI)** of each species was obtained by adding the values of relative frequency, relative cover, relative density and dividing it by (i) girth (ii) height and (iii) canopy cover of vegetation. Important Value Index (IVI) was calculated by the following formula.

$$\text{Important Value Index (IVI)} = \frac{\text{Importance Value (IV)}}{\text{Girth + height + canopy cover}}$$

(i) **Biodiversity Indices** measurement of diversity, as indicator for betterment of any ecosystem (also used to measures the species diversity

in the ecosystem), the indices used to assess and compare the diversity and composition of species, in different types of forests and at different altitudes was calculated by using Shannon-Wiener index, given below:-

Shannon-Wienner Index (1963)

H' =∑ (pi × Ln pi)

H = Measure of diversity

Pi = proportion of the species in the selected area

Ln Pi = natural logarithm of the proportion of each species

RESULTS AND DISCUSSION:

Effects of fire on diversity status of vegetation: There was highly significant difference regarding vegetative density among grasses and herbs in the study area. Results showed that maximum vegetative density was found as 42.6 m-2 in unburnt area while minimum as 25.3 m-2 was observed in burnt area. Further, highest density (114.5 m-2) recorded with *Isodon rugosuss* under unburnt area while lowest (0.9 m-2) was found in *Micromeria biflora* under burnt area. Overall *Isodon rugosuss* have more vegetative density (90.9 m-2) as compared with other species. Statistical analysis of data regarding vegetative density showed highly significant difference among tree and shrubs in the study area.

Data presented in Table 4.3.2 demonstrated that maximum vegetative density was found as 10.04 m-2 in unburnt area while minimum was 6.49 m-2 observed in burnt area. Further, highest density (36.36 m-2) recorded with *Dodonaea Viscosa* under unburnt area while lowest (0.94 m-2) was found in *Phoenix dactylifera* under burnt area. Overall *Dodonaea Viscosa* had more vegetative density (32.99 m-2) as compared with other species.

These results help to conclude that Low biodiversity index in burnt area showed that forest fire has significant effect on the plant distribution and vegetation composition being under serious threat of degradation. After fire and monsoon season, overall density of vegetation in burnt and unburnt sites, increased drastically. This is primarily due to the regeneration of herbs and shrubs favoured by fireash and rain(s).

Vegetational Study: The vegetational analysis, of the present study included assessment of density, relative density, frequency, relative frequency, cover,

relative cover, important value index (IVI) and bio diversity indices were calculated using Shannon-wiener index presented in tables 1, 2, 3, 4, and 5. The estimation of the above parameters in the unburnt area revealed that the shrubs and herbs dominated more in the vegetational composition. The results also explained that numbers of trees was less a shrubs and herbs were scanty and unevenly distributed. The results clearly confirm that the study area was a scrub forest and also it invited fire in dry season of the years. It was also noted that the vegetation composition study of the unburnt area, immediately after fire as well as in the monsoon seasons, revealed no significant difference in the vegetational composition. This also helped to conclude that this forest which was affected by fire its retrogression was being deeply promoted.

The study of the burnt area revealed that immediately after fire, shrubs was the worst affected component in the vegetational community which were observed in terms of their lower density, frequency, dominance values as compared to the unburnt area. The results also revealed that herbs and trees were comparatively less affected than shrubs. The vegetational analysis after fire showed comparatively higher vegetation value for shrubs and herbs. However, the study showed that there was no significant change in the vegetational composition value for trees.

The increase in composition of herbs and shrubs in the burnet area after fire season and monsoon favoured for their high regeneration. Since fire being the regular phenomenon in the study area, was seriously affecting the regeneration of tree species. Thus this study assuming importance on a larger perspective, had been a positive approach.

Diversity indices: The diversity indices of burnt and unburnt areas were analyzed and the results were presented in the table .The Shannon- Wienner index showed that high diversity was accounted in unburnt area (after fire and monsoon season). It is important to note that high diversity status, in terms of all the above indices, was reflected in burnt area after monsoon.

This study clearly shows that though the site is continuously disturbed from fire, it is having the potential to recover its original vegetation. Unless the regular occurrence of fire is not stopped, the forest may develop into pre-climax vegetation

and the vegetation composition may also end with fire, the hardy species alone. The vegetation analysis and diversity indices estimation repeatedly emphasized that the forest fire is totally changing the vegetation composition, in the study area. It was also indicated that forest fire is seriously promoting the retrogression, the present forest in the study site has developed to degradation. Serious efforts are needed to prevent forest fire in the study site to control the retrogression, as the vegetation would be enable to regain its original status.

Table No. 1 showing the Effect of forest fire on Biodiversity

Kind of forest	Area		Mean
	Unburnt	**Burnt**	
Trees	2.26 de	2.12 e	**2.19 C**
Shrubs	2.87 bc	2.61 cd	**2.74 B**
Herbs	3.47 a	3.23 ab	**3.35 A**
Grasses	2.88 bc	2.48 cde	**2.68 B**
Mean	**2.87 A**	**2.61 B**	0.19*
LSD	0.03*	0.12*	

Source: M.Sc(Hons)/M.Phil Thesis of the Principal Author- Forest Department. AAUR

Table No. 2 showing the Relative Cover, Relative Density, Relative Frequency and IVI of Grasses/Herb species under Unburnt area

Sr. #	Specy Name	RC	RD	RF	IVI
1	*Heteropogon contortus*	7.72	7.35	7.34	22.42
2	*Aristida depressa*	5.26	6.41	6.41	18.08
3	*Saccharum spontaneum*	8.87	9.36	9.35	27.58
4	*Pennisetum orientale*	8.54	5.01	5.00	18.55
5	*Sorghum halepense*	7.56	5.53	5.53	18.62
6	*Tagetes minuta*	8.38	7.64	7.63	23.65
7	*Xanthium strumarium*	13.14	21.21	21.19	55.55
8	*Parthenium hysterophorus*	8.87	7.12	7.11	23.09
9	*Verbascum Thapsus*	6.90	6.85	6.84	20.59
10	*Cannabis sativa*	5.26	0.66	0.66	6.57
11	*Micromeria biflora*	4.76	0.55	0.55	5.87
12	*Isodon rugosuss*	14.75	22.30	22.38	59.43

Source: M.Sc(Hons)/M.Phil Thesis of the Principal Author- Forest Department. AAUR

Table No. 3 showing the Relative Cover, Relative Density, Relative frequency and IVI of Grasses/Herbs Species under Burnt area

Sr. #	Specy Name	RC	RD	RF	IVI
1	*Heteropogon contortus*	7.67	8.28	8.29	24.24
2	*Aristida depressa*	6.39	6.64	6.65	19.68
3	*Saccharum spontaneum*	8.95	11.13	11.08	31.16
4	*Pennisetum orientale*	8.18	4.87	4.87	17.92
5	*Sorghum halepense*	5.11	4.65	4.65	14.42
6	*Tagetes minuta*	8.95	7.97	7.98	24.90

7	*Xanthium strumarium*	15.34	22.15	22.16	59.64
8	*Parthenium hysterophorus*	7.67	6.64	6.65	20.96
9	*Verbascum Thapsus*	6.39	4.87	4.87	16.14
10	*Cannabis sativa*	3.83	0.33	0.33	4.50
11	*Micromeria biflora*	3.58	0.31	0.31	4.20
12	*Isodon rugosuss*	17.95	22.15	22.16	62.25

Source: M.Sc(Hons)/M.Phil Thesis of the Principal Author- Forest Department. AAUR

Table No. 4 showing the Relative Cover, Relative Density, Relative Frequency and IVI of Trees/Shrubs species under Unburnt area

Sr.#	Specy Name	RC	RD	RF	IVI
1	*Pinus roxburghii*	9.04	3.07	3.08	15.18
2	*Mallotus philippinensis*	6.53	1.42	1.42	9.36
3	*Zanthoxylum armatum*	7.53	1.57	1.58	10.68
4	*Phoenix dactylifera*	2.51	0.67	0.67	3.85
5	*Acacia modesta*	5.02	1.26	1.26	7.54
6	*Punica granatum*	7.53	1.97	1.97	11.47
7	*Cedrela toona*	9.04	9.45	9.47	27.95
8	*Butea monosperma*	8.03	7.87	7.89	23.79
9	*Lantana camara*	8.53	7.48	7.50	23.51
10	*Dodonaea Viscosa*	7.43	21.34	21.30	50.07
11	*Carissa opaca*	5.52	7.40	7.42	20.34
12	*Pyrus pashia*	5.22	5.11	5.16	15.50
13	*Justicia adhatoda*	4.02	2.13	2.13	8.27
14	*Prunus domestica*	3.71	2.17	2.18	8.07
15	*0tostegia limbata*	4.92	11.91	11.83	28.66
16	*Jasminum mesnyi*	2.51	12.82	12.78	28.11
17	*Zizyphus sativa*	2.91	2.36	2.37	7.64

Source: M.Sc(Hons)/M.Phil Thesis of the Principal Author- Forest Department. AAUR

Table No. 5 showing the Relative Cover, Relative Density, Relative Frequency and IVI of Trees/Shrubs species under Burnt area

Sr.#	Specy Name	RC	RD	RF	IVI
1	*Pinus roxburghii*	12.63	4.59	4.58	21.79
2	*Mallotus philippinensis*	4.46	1.34	1.34	7.14
3	*Zanthoxylum armatum*	5.20	1.59	1.59	8.37
4	*Phoenix dactylifera*	2.98	0.85	0.85	4.69
5	*Acacia modesta*	5.94	1.34	1.34	8.62
6	*Punica granatum*	7.43	1.84	1.83	11.09
7	*Cedrela toona*	11.14	9.18	9.15	29.47
8	*Butea monosperma*	8.91	8.57	8.54	26.02
9	*Lantana camara*	10.40	9.30	9.27	28.97
10	*Dodonaea Viscosa*	7.43	26.73	26.85	61.00
11	*Carissa opaca*	5.20	7.35	7.32	19.87
12	*Pyrus pashia*	4.46	3.06	3.05	10.56
13	*Justicia adhatoda*	2.98	1.71	1.71	6.40
14	*Prunus domestica*	2.98	0.97	0.98	4.93
15	*0tostegia limbata*	2.98	10.94	10.98	24.90
16	*Jasminum mesnyi*	2.23	9.18	9.15	20.56
17	*Zizyphus sativa*	2.67	1.47	1.46	5.61

Source: M.Sc(Hons)/M.Phil Thesis of the Principal Author- Forest Department. AAUR

CONCLUSIONS:

The effect of forest fire has adversely influenced the vegetation composition of the study area. The biodiversity indices and the vegetation study helped to conclude that the fire seriously damaged the vegetation in the study site. The analysis in the burnt and unburnt area showed that the forest has good regeneration potential, especially after monsoon season. However, the regeneration potential has been seriously affected due to regular occurrence of forest fire in the study area. The biodiversity indices and vegetational study helped to conclude the regeneration potential of the forestry in study site as good enough to regain its original vegetation status, if the fire is prevented through good forest management plan.

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THE DELEBRATIONS OF WORLD DEVELOPMENT REPORT (WDR) 2016, ON DIGITAL TECHNOLOGIES, WITH PAKISTAN PERSPECTIVE

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ABSTRACT

As the Global Population reaches 7.4 Billions (Bns), the internet, the Broadband and cell phone technology has grown simultaneously. The users with mobile cover reached 07 Bns, amidst the number of mobiles touched 05.2 Bns. The total internet users were recorded 03.2 Bns and High speed internet users numbered 01.1 Bns, as per world Development Report (WDR–2016), with the introduction of digital technology, its use brought in automation to the effect that all 193 member countries of UN had National Websites, a total of 101 member countries enabled citizens to create personal on-line account while 190 countries of the world automated financial management, Simultaneously 179 out of 193 countries used such systems for custom clearance via air, sea and road ports of entry and exit. WDR-2016 elaborated e-governments, e-commerce and e-business of various countries using digital platforms for e-ID, e-filing, e-service portal and advocated Global Open Data Index (GOPDI). The number of internet users indicated that nearly 09 out of 10 businesses in 36 high income Organization of Economic Cooperation for Development (OECD) countries had a broad band internet connections in the year 2014 while Pakistan, with a population of 194.7 millions, being one of the 34 developing countries where 08 out of 10 individuals owned a mobile phone in 2016.By the end of March 2016, the Broad band subscribers stood at 30.99 millions in Pakistan while cellular (mobile) phones subscription reached 131.4 millions. The DSL, Wi MDY, EVDO, HFC and FTTH collectively had 3.13 million subscribers and this collectively formed almost 90% of the total Broad band subscribers. The quantum of international traffic (both in-coming and outgoing) stood at 14545 million minutes in Pakistan during the period July-2015 to March 2016, as compared to 5643 million minutes in the same period the previous year (July 2014 to March 2015). This paper also describes various digital platforms of internet used in US, Latin America some of the African countries, Mid-Easter countries, South Asia including Pakistan in terms of e-business, e-commerce and connecting people. The WDR-2016 while its deliberations also recommended expansion of coverage to 95-96% people of the world against present 92% with reasonably competent prices affordable by end-users and also to formulate Policies and implement such regulation for improvement and curbing misuse.

Key Words: WDR-2016, Digital Technologies, IT and Telecom Technologies, OECD, and Developing world – Pakistan.

INTRODUCTION:

The World Development Report (WDR)-2016, No.102725, Sixteenth of its series since 2001, yearly Published as a Public Document, mainly encompasses the information technology(IT) oriented Digital Technology (DT) based, update of

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various Developing Countries (Pakistan is included) and majority of the Developed economics of OECD countries. The report (WDR-2016) mainly discussed at length the access of computer based links of IT and DT with high lights of email utilization in e-commerce, e-government, e-business and access to various government's Accounting, Financial Management, Customs clearance, taxes and for other similar uses (WDR-2016, 2014 and 2015).

This effort will Summarize material provided in the WDR-2016 while work done and updates in IT digital technologies namely the mobile phones, the Broad-band and email used in Pakistan together with the e-commerce, e-business, e-Accounting, Customs clearance and a variety of other things will be discussed and updated, in the light of Pak. Economic Survey Reports (Ejaz wasti-2013-14, 2014-15 and 2015-16).

The WDR-2016 is a Comprehensive but a detailed document comprising Six chapters on (i) Accelerating growth, and Agriculture, (ii) Expanding Opportunities, (iii) Delivering Services, (iv) Data Revolution, Smart Cities, (v) National Priorities including (a) Energy Sector (b) Global Cooperation, (c) Environmental management and (d) Six Digital Technologies, Supported with 541 references.

An overview of the WDR-2016 Under "Connecting Governments" indicates that:-

- Member States of the UN including Pakistan had National Websites.
- 101 member Countries enabled their citizens to create personal On-line account, (Pakistan included).
- 73 member Countries filed income taxes.
- 60 member Countries registered business.
- 190 member Countries automated financial management.
- 179 (out of 190) member Countries used such systems for customs processing on various airports, Sea-ports and Dry ports (road entries).
- 159 member Countries used automation for tax purposes.
- 148 member Countries had some kind of digital identification.
- Only 20 had multipurpose digital identification platforms.

Pakistan being the sixthly largest populous Country of the world, recorded the estimated population of 197.4 million. The world Global population, as documented, was 07.4 Billions (Bns), as of June-2016 and the total number of population with mobile cover remained 07 Bns. Whereas the number of mobile phones (sets) were 05.2 Bns. Simultaneously total internet users were 03.2 Bns while high speed internet users were 01.1 Bns and expected to reach 363 millions in 2050, with the growth rate of 1.95% annually (World Population data sheet-(2013).

The Broad band subscriber base reached 03.4 millions, the previous year. It was estimated that 0.717 million new subscriber had joined the Broad band platform in Seven-08 months while a total of 13 million people are the end users as 3.4 millions being the subscribers.

The cellular Mobile Services showed that subscriber of cellular mobiles were increased by 45% during the last 05 years (2011-2014) and by end of march 2014, the number of subscribers was 136.5 millions as compared to 118.3 millions in the same period, the previous year (2013) showing an increase of 15.4%, in just one year. This also indicated that the area under Cellular Cover has reached 92% stating that the number of cell sites have grown by 37,169 by the end of March-2014 as compared to 35,889 in the previous year (2013) as detailed in the Pak. Economic Survey Report-communication (Ejaz Wasti-2014-15).

The proposed objectives, as can be depicted from the WDR-2016 were:-

1. To explore the impact of the internet, mobile phones and related Technologies on economic development.
2. To provide updated information to the world community (interconnecting nations) specially the 193 Member Countries of the UN, using mobile phones, internet and computer based automation in their Governments.
3. To provide access to various Countries of the world to e-commerce, e-Business, e-taxing and Financial Management.
4. To provide access to the enablers, the four digital technologies namely:-

   - Digital finance   - Social media network
   - Digital identity   - Data-revolution

WDR-2016-Delebrations: The WDR-2016 indicated that 09 out of 10 businesses in high income OECD countries, had a Broad band internet connection upto 2014,

under the embit of connecting Business. Since Pakistan is Not yet a member of OECD, hence was not included. While the report declared 08 out of 10 individuals in the developing world owned a mobile phone, including Pakistan.

Some of the e-tagging as reported in WDR-16 that under the on-line platforms for e-business and e-commerce , using internet, the email and CRM have since been established, people use them as their instruments for economic activities, across countries e.g. china uses alibaba, amazon, each Net, Taobao and Didi Kuidi, Maroccans use Anou, Kenya uses i-Procure and M-Pesa, while Chile, Peru and South Africa use e Bay for business, amazon is used in USA and linked with other Countries. China has also introduced Customer-to-Customer (C2C) for market selling and Business-to-Business (B2B) for transactions while Sino Export destinations are linked with Massive Open On-line courses (MOOCs) where as for free lance professional and Technical services "e-lance ODesk" is being utilized. Simultaneously "Sooktel" is a platform for Job-creating and employer-candidate link, on-line jobs successfully being utilized in Gaza, West Bank, ARE, Jordan, Morocco, Rowanda and Somalia.

Some interesting information was also included in WDR-2016 Report such as (i) Uber-The world largest taxi-company owned no vehicle, (ii) Face book. The world most popular media owned no content, (iii) alibaba- The most valuable retailer had No inventory and (iv) Airbnb. The world largest accommodation provider owned no real estate.

The WDR-2016 has updated the use of Digital technologies in Agriculture Sector specially use of Global Positioning System (GPS) Connecting Markets both National and International with an expanded/expanding opportunities, as well as connecting people reported that (i) up to the year 2000, at least 60% of the world people did not have Land Line phones while (ii) Internet adoption lags behind mobile phone access but has tripled since 2005. (iii) In developing Countries in the year 2016 28% of the population had reported access to internet at their homes. Pakistan being one of the 34 low and middle income had been included, (iv) In Advanced economics (26 Developed Countries of OECD) 80% of the people had access to the internet at their homes. Since Pakistan being Not a Member of OECD, was not included.

Some of the Socio-economic data base for different Regions with their indicators/platforms enumerated in WDR-2016 are reproduced in the table No.01 below:-

Table No.01 showing the data codes used

Sr.#	Data base indicator/plat for	Region/Countries
01	SED-LAC	Latin American Countries
02	SED-LAS	Latin American and Caribeans
03	SAR.MD	South Asia Region
04	STET	(13 Countries)

(Skills towards employability and Productivity)

- Armenia
- Colombia
- Ghana
- Lao PDR
- Macedonia
- Ukraine
- China
- Bolivia
- Georgia
- Kenya
- FYR
- Sri Lanka
- Vietnam

Pakistan Not included Sharing Infrastructure

- Wireless mast
- Cable Duty
- Electricity and Transport

5	INDUS	INDIA
6	INFRATEL	
7	Bofinet	Botswana
8	Back bona	Burundi
9	IXP (Internet exchange point)	Many Countries

Source: SRD-2016.

While the Social media platforms, delivering Services in many Countries (in which Pakistan is included are/were (i) Face book, (ii) Linkedin and (iii) Twitter in US, (iv) Sina Weibo and (v) We chat in China and (vi) VK in Russia etc.

The WDR-2016 involved three dimensional strategy for digital access for Nations namely (i) inclusion, (ii) efficiency and (iii) innovation, expressed diagrammatically and reporting/ narration, with the example of Connecting governments as:-

a) World Bank Global-e-government System data base.

b) WB Global digital identification for Development (ID-40) 2015 data base.

c) UN-2014 data of http:/bit.do/WDR-2016.

Pakistan Perspective (Telecom and IT Sectors) status in 2013-14.

- Cellular Mobile Sets with battery = 293.1

- Other Telecom apparatuses = 369.0

  Total imports = 662.1

- Total Subscribers (by the end of March-2015) of mobiles = 136.5 million peoples, as compared to= 118.3 million people last year (2013-March) with an increase of 15.4%.

- During July 2013-March 2014, a record 221.7 Bns SMSs were exchanged by mobile consumers

- The Broad band penetration increased to 1.92% in February 2014 as compared to 1.52% in June-2013.

- The Broad band subscribers reached 3.4 million in 2014, as compared to 2.7% in 2013, hence the Broad band users were 13 millions (taking the average number of 04 , in a family).

Status in 2015-16:

- In 2016 (by the end of March 2016) the Broad band subscriber stood at 30.99 millions while the number of cellular (mobile) subscription reached 131.4 million.

- The 3G AND 4G LTE subscriber reached 27.87 millions at the end of March-2016, as compared to 13.49 millions as of June-2015.

- On an average, one million subscribers per month, in that period.

- This collectively formed almost 90% of the total Broad band subscribers.

- DSL, WiMAX, EVDO, HFC and FTTH collectively had 3.13 million subscribers at the end of March-2016.

- The total international traffic (both incoming and outgoing) stood at 14545 million minutes during July-015-March-016, as compared to 5,643 million minutes in the same period last year, July-014 to March-2015 (Ejaz wasti 2016).

Similar platforms are being utilized in Pakistan by Education and professional qualified personnel for Jobs such as vacancy announcements by UN offices (WHO,FAO,UNDP,UNESCO).The World Bank Group-and more than 85 Embassy's and High Commissions including international NGO, The USAID, AUS-AID,CIDA, ADB, Various Universities and the Higher Education Commission (HEC). Brilliant students from various local Universities are getting admissions in Foreign Universities, based on their merit and research work, towards their Ph.D. programs.

SUMMARY OUT COMES

i. The WDR-2016 in an update of digital technology and information of 193 Member Countries of the UN regarding internet uses, for identity and data revolution.

ii. Various Platforms, designated by 36 OECD Member Countries and 34 Developing Countries, are being used for e-business e-commerce, e-governments for automation of accounts e-taxing and customs clearance at air, road and sea ports.

iii. There are deliberations and recommendations for internet based sharing information by both developed and developing world in the field of cooperation, expanding services, delivering services, data revolution, National priorities, environmental management, agriculture and six digital technologies.

iv. Some of the platforms, used in various countries, for business and economic activities have been accumulated e.g. alibaba , each Net, amazon by US, taobao and Didi Kuindi used by China, Anou by Morocco , i Procure and M pesa by Kenya, while e-Bay is being used by Chile, Jordan, Peru and South Africa (SA).

v. China has introduced Customer-to-Customer (C2C) and Business-to-Business (B2B) for market. Selling and business deals respectively. Simultaneous China is using Massive Open On-line Courses(MOOCs) for Sino-Export destination and "e-lance O desk" is being used for free lance professional services.

vi. SOUKTEL is the platform for Job-creating and employer-candidates link "on-line Jobs" successfully being utilized in Gaza, West Bank, ARE, Jordan, Morocco, Rawanda, Somalia and also elsewhere.

vii. The social media platforms in use by US and others include (a) face book, (b) Linked-in (c) Twitter while by China the (a) Sina Weibo and (b) We chat are used. Similarly VK is used in Russia, INDUS and INFRATEL used by India, Bofinet by Botswana and Backbone by Burundi.

viii. The Report (WDR-2016) deliberated the policy guide lines to the use of Digital technologies reach more that 95-96% people of the world as compared to 92% but on competitive and cheaper rates to the consumers.

ix.   The Report also recommends Rules and Regulations be framed and implemented for curbing misuses, and for better use.

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NB: The WDR-2016 is available on the internet which can be reached.

THE STATUS OF PROTECTING AND SUSTAINABLE USE OF TERRESTRIAL ECO-SYSTEM OF PAKISTAN

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ABSTRACT

This research cum status presentation provides the Environmental protection efforts made by the National Environmental Action Plan (NEAP) addressing the Millennium Development Goal-No. 7 (MDG-7), under International Commitments, in the light of Animal and plant Health Inspection Services (APHIS), of the FAO-UN, Office International Des-Epizooties (OIE) and other Internation fora. This status paper provides efforts made in wild life Conservation of 11.6% against 12% targeted, Access of safe drinking water to 89% of Pakistan inhabitants against 93% of the target. Simultaneously 72% of the population have access of sanitation against 90% targeted. Pakistan has increased its forest cover area of 05.2% against 6% targeted. The air quality data indicates presence of high concentrations of suspended particles/particulate matter, in air as 02-3.5 times, higher than the safe limits. The oxides of Nitrogen (NOx) was also increasing in major cities, as compared to other developing countries. The paper recommends the suggestive efforts as well as promotion of Terrestrial Eco-system (TES) in the country.

Key words: Protection of Environment, Sustainability Terrestrial Eco-System Pakistan.

INTRODUCTION:

The status of protecting and sustainable use of Terrestrial Eco-System (T.E.S), in Pakistan (the eco-system) pertain to National environment, the people, must be organized to protect all its entities namely (i) land (ii) waters (iii) forests (iv) flora and fauna (v) human beings (vi) animals (domestic as well as wild life) (vii) vegetation (crops, weeds, fodder) and (viii) minimizing environmental pollution.

Pakistan being an agricultural country with a blessed environment of four (04) seasons, two of which are most important (a) Rabi season and (b) Kharif season. Wheat, oats, barley fodder crops, oil seed crops and vegetables are grown in Rabi season along-with fruits while maize rice, cotton and other seasonal crops, vegetables and fruits are grown in kharif season. All these provide food for human beings, animals and poultry. As the human population is increasing, we also need to increase our agricultural production, say by the year 2030 and beyond (Shafiq Qadir et al 2015).

We need to protect this agricultural land by bringing more area under

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cultivation, instead of spoiling it with construction of housing schemes, industrial installations and using our rich soil for brick making. The government should make laws to protect our land so that it can best be utilized for agricultural productivity, growing animals for milk and meat production because we need milk, meat, eggs and poultry for our people and some authors have targeted the year 2030 for increased livestock production as put forward by Muhammad Hafeez and Mashook Ali (2014), and Agri food requirements to 2030 and beyond Sajida Tufail et al (2015). If we are unable to protect our land, we will lack behind other nations and might face drought due to low production.

Like agricultural countries of the world, Pakistan is blessed with seasonal rains and most of the small and large water reservoirs have been established, using river waters. Again Pakistan irrigation system is famous as best in the world. Efforts have been made and some of the water reservoirs are really helpful in off season. Five rivers namely Jhelum, Chenab, Satluj, Ravi and Indus are the main water resources which meet/join the Indus and this leads to provide water to irrigation canals of the country in Punjab and Sindh provinces, mostly. In Khyber Pakhtoon khwa rivers Kabul and Swat join river Indus at Khairabad enroute irrigating water canals in Peshawar Charsadda, Mardan and Swabi areas. Some of the water reservoirs also produce Hydroelectricity which is a rich source of energy and power, as detained in the Pak Economic survey Report by Ejaz Wasti (2014-15). The following water reservoirs/Dams are famous:

- Warsak Dam (KPK)
- Tarbela Dam (KPK)
- Chashma Dam (KPK)
- Munda Dam (KPK)
- Mangala Dam (Punjab)
- Kurram Tangi Dam (KPK)
- Tanda Dam (KPK)
- Kandar Dam (KPK)
- Bhasha/diamer Dam (NAS)
- Sat para Dam (Balochistan)
- Hab Dam (Sindh)

Lakes

- Manchar (Sindh)
- Hali Jee (Sindh)
- Hanna (Balochistan)
- Dhabe Jee (Sindh)
- Gomal Zam Dam (KPK)
- Darwat Dam (Balochistan)
- Nai Gaj Dam (Sindh)
- Naulong Dam (Sindh)

Forests (Protection): Forests are essential for any developing as well as developed country. Larger the area under forest, better will be the eco-system.

Forests carry lot of importance. At present area under forest is 4-5% while under the Millennium Development Goal (MDG) No-7, in addition to other environmental protection, the target of area under forest by the end of 2016 will be six (06) percent so, why we must protect our forests?

- Because we must use Terrestrial eco-system, sustainably, in the country.
- Because we must get quality wood, timber for our furniture, fire wood, wood products and by-products.
- Because we must keep our eco-system intact, sustainably.
- Because we must restore our flora and fauna including vegetation in hilly, sub-hilly and plane areas including mangroves in the coastal areas.
- Because we should avoid or at least resist the bio-diversity threat to our eco-system.
- Because we must provide natural habitat for our wild-life.
- Because we must maintain our weeds, herbs and shrubs for grazing requirements of our livestock, sheep/goats and other wild animals.

Flora and fauna, Weeds, Other Vegetation, Natural Fodder: To summarize the Natural growth of flora, fauna, weeds, other vegetation and natural fodders within our forests and range areas, observed as beneficial not only to animals but to human beings as well.

- Most of these are of medicinal importance
- We need not to specially grow these and without usual efforts (ploughing putting seed, spreading fertilizer, use of pesticides, cutting and harvesting etc etc), these are grown just with rain water. (this is a huge chapter in agriculture sciences)
- These are centuries old vegetation
- Some of the grasses remain as fodder while others are used for commercial purposes.

Protection of environment from Pollution: The environmental protection is now our obligation and under various international agreements (to which Pakistan is a signatoree member, such as:

- International labor organization (since-2009)

- Vienna Convention (since 1997)

- Animal and Plant Health Inspection Service (APHIS) of Food and Agriculture Organization (FAO) of the UN. (since 1986)

- World Health Organization (WHO) of UN (since-1986)

- Office International des Epizooties (OIE) since (1986) (International Animal Health Organization (Paris-France).

The Ministry of Environment, GOP as well as the provincial Ministries of Environment under 18th amendment, have devised National Environmental Action Plan (NEAP) to address the MDG-7 and the indicators show that Pakistan is on track to achieve four, as detailed in the recent updates by M/O environment, as reported by Ejaz Wasti (2013-14) (2014-15):-

- Protecting area for wild-life conservation (11.6% against the target of 12%)

- Reducing sulphur/sulfur content in high speed diesel.

- Improving DGP per unit of energy.

- Access to safe drinking water (89% against 93% as targeted)

- Currently 72% of population has access to sanitation against a target of 90%.

- Pakistan has increased forest cover of 5.2% of the nation's land against the target of 06%.

Air-Pollution: As the population density was 236 persons per sq. km, the population of Pakistan in 2014-15 was 197 million (National Institute of Population Studies (NIPS), GOP Islamabad (2013-14). The air quality data indicated presence of high concentration of suspended particles/particulate matter in air as 2-3.5 times higher than the safe limits. Oxides of Nitrogen (Nox) was increasing in major cities due to increased number of CNG vehicles on the road, as reported by Ministry of Environment (2013-14) and (2014-15) higher as compared to many other Developing Countries. It is strongly recommended that both public and the government combined make efforts to avoid this pollution.

Restoration of Torrestria Eco-Systems (T.E.S): For Restoration of T.E.S, sustainable rural and community development certain points need proper attention:

- Coordination and sustained efforts, rather combined efforts, in restoring each component of eco-system.

- These efforts can be splitted as under:-

  ➢ Individual efforts

  ➢ CBOs-(Community Based Organizational efforts, in any area.

  ➢ NGOs- (Non-Governmental Organizations) efforts, in any area.

  ➢ Provincial Governments efforts.

  ➢ GOP- based efforts.

The Restoration Efforts must focus on the following main points:-

➢ Sustained action plan for restoration of agricultural, forest and range-lands.

➢ Conserted efforts/measures to stop: (a) land sliding and (b) soil erosion

➢ Conservation of our Forests, Protecting flora and fauna, the Vegetation and the wild-life (zoo animals and birds).

➢ Restoration of various domestic animals (breeds of cattle and buffaloes, sheep and goats, including poultry and other birds).

➢ Excessive use of water be made limited and wastage of water be avoided to help restore water resources.

➢ Small dams be constructed, where natural demography is available. This will be two-prong beneficial (a) for drinking and (b) for agriculture.

➢ Streams and canals must not be polluted with sewage and/or excreta.

➢ Seasonal weeds must not be burnt or cut, to clean the agricultural field, rather these can be utilized for better purposes.

➢ Industrial unit's effluents/wastes and hospital disposables must be treated first and then burnt and buried in the soil.

Promotion of T.E.S: As under-stood to some extent, efforts are underway in many countries, (the world over) in Protecting and Restoration of T.E.S.

Q-   How to promote it on sustainable basis?

A-   We need to involve people at (i) individual, (ii) Community and (iii) Govt. level the promotion of T.E.S by taking the following steps:-

(i)   Create Awareness: This can be done through Mass Communication using Newspapers, pamphlets, social gatherings, community meetings, in the mosques, churches, hotels, restaurants, and wall chalking etc.

(ii) Activating Communities: Social work oriented CBOs, NGOs, civil Societies and Associations must put the promotion of T.E.S on their priority agenda and start working on it.

(iii) Organizing Gathering (Periodic): Immediate after creation of awareness, the CBOs, NGOs, Societies and Associations Must organize periodic gatherings at prominent places. This can be done in field areas where the T.E.S can be well understood e.g. in Hill-Parks, Zoological gardens and Wild life park areas, Safari Parks, Water reservoirs/ Dams, Land Sliding and Soil erosion places.

(iv) Involving Science Graduates and Subject Specialists: Forest, Environment and Rural Development graduates Simultaneously Agriculture, Livestock, Zoology and Plant Sciences graduates and post graduates must be added to such teams when any task in handed over to a group of workers.

(v) Generate Financial Resources: Each and every such effort will need financial resources and certainly there must be proper accounting system to resource management, specially the financial matters. which can be achieved through: (i) Donations from resourceful persons (ii) Individual donation (from members of the Society) (iii) CBOs, NGOs generated funds (iv) Approaching Financial /Funding agencies (based on project proposals) (v) Project preparation, operation, seeking financial assistance and nicely documenting personnel can be hired for this purpose.

It is hoped that with such an organized approach we can promote the sense of importance for promotion of T.E.S amongst masses.

Managing Forests: A most important aspect of Restoration, Protection and Promotion of T.E.S is the management of Forests, Not only in Developing but in Developed Countries of the World. In South Asia and specially an agricultural country like Pakistan. Forest Management, a key subject being taught at B.Sc (Forestry), M.Sc (Forestry), M.Phil (Forestry) and Ph.D levels.

The issue of Management forests is not only the Government duty but local communities and other entities of the society must be involved in this

management. Before going into the details of managemental steps, we must have an overview of the categories of the forest, their importance, their geographical location and the key status of each kind/category of forest, in the broader subject of T.E.S.

The forests can be summarized as under:-

i.   **Hilly Area Forests:** These include pine, kail, Deudar and Akhrote trees with ground vegetation, herbs, shrubs (flora and fauna) as part of forest eco-system.

ii.   **Sub-hilly Forests:** These include sheesham, olive, keekar, partal, cheel, wild mulberry.

iii. **Plane area Forests and Range Forests:** These include sheesham, phulahi, keekar, beri, shah-toot (mulberry), eucliptus, Golar, Bargad, Mango and neem etc. Many fruits trees, medicinal plants and trees, trees of wild-life importance are also part of forest and agricultural eco-system.

iv.   **Mangrove Forests:** These include low forest trees, jungle-wet land forests, and all coastal area forests, as well as the brakish-water low forests.

All the forests are part of Terrestrial Eco-System (T.E.S)

- These produce oxygen necessary for humans, animals and wild life.
- These utilize carbon dioxide, hence clean the environment.
- Forests are initiators of rains.
- These attract continental birds, birds of prey, the wild jungle fowl, and create beauty in the nature.
- Most of these bear fruits needed for wild life, the birds and human beings.
- These are essential for nests of birds, beehive formation and protecting ground vegetation.
- Forests provide plenty of raw material for our agro-forest industry.

How We Can manage Forests: The following important points will reveal why forest management is necessary:-

➢ The deterioration of forest situation will reveal, the environment as not clean.

➢ Trees grow in many years but cutting might take less than an hour. Reducing forests will lead to bad T.E.S.

➢ More trees managed will lead to good nations.

➢ Forest conservation must be re-organized in any country, specially in Pakistan.

➢ More the area under forest cover, more will be the rains.

➢ Un-authorized cutting of forest wood must be banned by legislation.

➢ Those who are involved in un-authorized cutting of forest trees must be put behind the bars.

➢ Those involved in putting the forests on fire must be subjected to rigorous imprisonment by legislation.

➢ Scientific improvement in forest must be carried out with strict management.

➢ Forest fires are always devastating and strict management and administrative efforts need to combat forest fires, as pointed out by M. Ibrahim and Amir Saleem (2016).

Combating Desertification: Desertification of forests, as already defined above, means removal, cutting of forest trees, range vegetation, and other herbs and shrubs from our land/soil.

Although we, as a nation, on the analogy of other nations, just leave a particular sector on the shoulders of officers and officials of that sector e.g. agricultural people have been declared for agriculture affairs, similarly other sectors.

We deem it fit for routine, as people of forests and environment responsible for forests and range management but what happens when 30,000-40,000 saplings are planted in both monsoon plantation and winter plantations, each year, w.e.f. early seventies.

No after-care, no follow-up by the departments personnel concerned is now apparently the reason. If even 30-40% of the saplings survive, that would have covered huge area under forests.

Some of the reasons of desertification have been denoted above which also include:-

(i) Less samplings grow to self-vigour, as small trees within 2-3 years.

(ii) Both the forestry and environment departments have less number of people responsible for follow-up and after care of plantations.

(iii) Most of the officers have shown lethargy in performing their duties.

(iv) The infiltrators or tress-passers become thieves of forest trees and take-away the wood, specially at night.

(v) There is no stern action taken against the defaulters.

(vi) Un-necessary and forced grazing of vagitaion by domestic animals (both large animals as well as small ruminants (sheep/goats) has resulted in desertification.

(vii) Since there is no facility of Sui-gas and fuel-gas cylinders in the nearby villages/towns or housing projects, the poor inhabitants of these Abadies start cutting trees as well as the seasonal vegetation(hedge bushes, bhang, pohli and kandiari, Moheri, and others), weeds and grasses, used as fodder as well as handicrafts etc.

(viii) The Nomadic and Pastoral flocks of migratory people who travel downhill in winter and up-hill in summer seasons also keep grazing whole the day. This also results in Desertification of forests.

Combating Efforts: The points narrated above responsible for desertification, if addressed one-by-one will result in combating desertification.

(i) Saplings once planted, must be subjected to aftercare.

(ii) Field force be increased by forest and Environment: Departments.

(iii) Forest officers and officials be made dutiful.

(iv) Watch and ward system needs streamlining.

(v) Stern action be taken against defaulter.

(vi) Grazing pattern must be regulated.

(vii) Fuel-gas and Sui-gas be made available.

(viii) Nomadic and pastoral migration be minimized.

Land Degradation: To achieve sustainable development goal-15, in utilizing T.E.S, it is an important approach that our Agricultural and Forest Covered land is not subjected to degradation. As understood, land degradation (LD) will adversely affect the growth of Forest trees, Agricultural crops, fodder and/or will spoil the effort of years in destruction land degradation (LD) can be further understood as splitted in the following categories:-

(i)   Land degradation due to land sliding (LS).
(ii)   Land degradation due to soil erosion (SE).
(iii)   Land Depletion due to water logging, salinity and mis-use of fertile land.

Halt and Reversal of Land Degradation: Since this a detailed chapter in Agricultural, Forestry and soil sciences subjects. National and internation status and approaches in halting and reversal in land degradation have been discussed and lot of data and billions (Bns) of rupees worth expenditure made, as well as proposed has been documented (Ejaz Wasti – 2013-14), (2014-15) and (2015-16) in Pak Economic Survey Reports.

Combating Land Sliding: Right from the top hill sides of the country in northern Areas (NAs), Gilgit and Baltistan Chitral, Mansehra, Abbottabad Murree hills Swat and Malakand including Azad Jamu and Kashmir (AJK). Millions of rupees have been spent on correction and combating land sliding on long term and short term plans:

a.   Brick, stone and concrete living can be seen right from

- Havellian – Abbottabad Road

- From chatter to Murree hills

- Murree Nathia galli road

- Thandiani road

- Murree Kohala, Muzaffarabad road

- Kotli Sattian Bagh road and other hilly sub-hilly roads

- Short term and long term planning is being carried out

b.   Brick, stone and concrete drains have been constructed and repair work contains to gush-out rain waters in specially in Monsoon and other rainy days

c. Individual large trees are also being protected in Hilly areas by developing spurs alongside root and tree base areas in several places, uphill and down- hill. These efforts need be continued.

Combating and Reversal of Soil Erosion: Soil erosion, as understood, is a disaster for agricultural land. This continues damaging canal lining and river banks, for the last many years.

Ministry of Food Agriculture and livestock (MINFAL) recently designated as M/O Food Securities and Research (MINFSR) GOP and Provincial Agriculture Ministries together with Department of irrigation in (a) Khyber Pakhtoon Khawa, (b) Punjab, (c) Sindh and (d) Baluchistan are continuously working on this issue. Billions of rupees are being spent on combating reversal of soil erosion every year, since seventies and eighties. Details of expenditure is available in the M/O Food Securities and Research Reports for the years (2013-14), (2014-15) and (2015-016), Pakistan Agricultural Research Council (PARC) as well as Pak Economic Survey Reports.

Since this is a huge task, hundreds of miles of canals and Rivers banks need Pakka lining (with either stones or cement-concrete) be constructed to stop soil erosion, saving thousands of hectares (ha) of fertile land. This land could certainly be used for additional agricultural produce.

Land Depletion (Combating and reversal): Land Depletion, due to (a) water logging and (b) salinity, has depleted, destroyed and made thousands of hactares of fertile land into barren land. Federal and Provincial Governments, the line ministries and Departments are continuously working on this issue and with dedicated efforts this problem is slowly and steadily being over-come by many methods:

(i)   Removal of water-logged and saline waters by digging small water courses in descending order, downstream.

(ii) Thousands of Dug-Wells have been working to fetch out saline water with motorized pumping, in almost KPK, Punjab and Sindh Provinces

(iii) Saline and water-logged resistant trees, crops and vegetation is being practiced.

> (iv)   Brick or stone lining is continuous being done in specially the water logged and salinity hit areas, year after year.

Mis-Use of Agri: and Forest lands (Combating and Reversal): Despite clear instructions of stopping mis-use of Agri: and Forest lands in the following actions:-

(a) Brick making from agricultural/fertile land.

(b) Establishing Housing Societies and satellite towns on fertile land.

(c) Establishing commercial/manufacturing units/factories on agricultural land.

How to Combat and Reversal: The brick making be stopped, forth with. Cement and sand blocks may be encouraged for construction work. New Housing Societies/Housing schemes be established in Barren Demography of the country. No commercial unit/Factory be allowed to be established on fertile land.

Halting Bio-Diversity Losses: Measures to be taken in halting biodiversity losses (a huge chapter to be discussed). This will be briefly narrated here. We can easily split this in the followings aspects:-

> (i)   Halting biodiversity losses in agro forestry/Agricultural crops, weeds, fodders, range vegetarians (herbs, shrubs, rangeland vegetation and natural flora and fauna including medicinal plants etc.).
>
> (ii)   Halting bio-diversity losses in domestic animals (both large animals- cattle/buffaloes and small ruminants, sheep/goats and wild life (zoo-animals) birds and other migratory animals and birds.
>
> (iii)   Halting bio-diversity losses in forests (hilly, sub-hilly, plane area forests and mangrove forests).
>
> (iv)   Halting biodiversity losses in pests.
>
> (v)   Halting bio-diversity losses due to environmental pollution (Environmental protection)

Bio-diversity Loss Aspect and Measures to be taken to combat losses

(a)   Halting Biodiversity losses in agriculture, range vegetation and natural fauna and flora.

> (i)   Crop seeds, under the threat of biodiversity, must be stopped from further propagation.

(ii)   Fodder seed varieties, showing mutation, must also be stopped.

(iii)   Virus and bacterial disease resistant varieties must be introduced.

(iv)   For range land vegetation, (lower forest flora and fauna) use of dangerous pesticides/herbicides and weedicides must made be limited.

(v)   Resistant varieties must be introduced.

(vi)   Medicinal plants and weeds must not be subjected to pesticides.

(b)   Halting Biodiversity Losses in Animal Species

(i)   Excessive exports and massive slaughtering of various specific breeds of domestic and wild animals be stopped, henceforth.

(ii)   Import of exotic blood (either dairy animals, semen or embryos for cross breeding (with result into bio-diversity of our indigenous germ plasm) should be minimized.

(iv)   Under protective measure it is important that breeding, propagation and selection with each breed of cattle, buffaloes, sheep/goats and poultry, national action plan be devised, approved and implemented.

(c)   Halting Bio-Diversity losses in forestry.

(i)   Forest conservation strategies and action plan be implemented.

(ii)   Strict vigilant/watch and ward be observed in protecting forests in hilly, sub-hilly, planes and mangroves.

(iii)   After station plans be continued both in Monsoon and winter plantation seasons in almost all areas specified for this purpose.

(iv)   Attention must also be paid to avoid desertification.

(v)   Area specific forestry must be protected, to maintain terrestrial eco-systems on sustainable basis.

(d)   Halting Bio-Diversity in pests

(i)   Most of the Natural pests are part of our eco-system and biological part of our environment. These must be protected.

(ii)   Excessive use of pesticides is otherwise killing beneficial pests, the aphids, the Jassids, the hopers.

(iii)   Some of the pests are becoming resistant and more concentration of pesticides are need. This is an economical loss to farmers.

(iv)   All such efforts must be made to adopt environmental friendly atmosphere created to maintain our eco-system.

(e)   Halting Bio-diversity losses due to environmental pollution.

(i)   National Action Plan (NAP) of the National Environmental Protection Agency (NEPA), under the Ministry Environment and climate change must be implemented.

(ii)   All stake holders must coordinate in such programme on sustainable basis.

SUMMARY CONCLUSION:

National Action Plan needed for Sustainable Development: To summarize, the topic of protection, restoration and promoting sustainable use of T.E.S, an action plan is needed to be implemented. This action plan must be devised in the light of our national and international commitments, as under:-

(a)   The name of the ministry of environment and the M/O climate change must be merged and re-designated as ministry of sustainable   development, both at national and provincial levels.

(b)   Work on already devised national plan of action (NPA) of the environment and climate change must continue.

(c)   Restoration of forests, livestock, wild life and flora and fauna, as part of our eco-system, must be ensured on sustainable basis.

(d)   Land depletion (both as sliding land and soil erosion) must be halted with   continuous expenditure allocated to irrigation departments and work carried out one sustainable basis.

(e)   More water reservoirs be established to provide drinking water, water for irrigation as production of hydro-electricity from such dams.

(f)   Water reservoirs will also help in aqua culture (fresh water fisheries) and attraction of migratory birds, as part of our eco-system.

(g)   Mangroves forests management programs must be implemented to protect Delta, the brackish water (for shrimp production) and marine biology, for our sustained utilization of T.E.S.

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