



AIC Report

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**Department of Agronomy
Bacha Khan University, Charsadda**

Bacha Khan University, Charsadda
Standards and Criteria for Agriculture Degree Program Evaluation
Agronomy B.Sc (Hons) 2014-15

| Sr. No. | Criteria | Points Assigned | Points Awarded |
|--------------------------|---------------------------------------|-----------------|----------------|
| Major Criteria | | | |
| 1 | Strength and Quality of Faculty | 250 | 175 |
| 2 | Curriculum Design and Development | 150 | 120 |
| 3 | Infrastructure and Learning Resources | 200 | 110 |
| 4 | Students Support and progression | 100 | 60 |
| Sub - Total (a) | | 700 | 465 |
| Minor Criteria | | | |
| 5 | Research and Consultancy Activities | 150 | 85 |
| 6 | Governance and Leadership | 100 | 60 |
| 7 | Recent Innovations and Best practices | 50 | 30 |
| Sub - Total (b) | | 300 | 175 |
| Grand Total (a+b) | | 1000 | 640 |

(Six hundred and forty) **64%**

Name and Designation

Signature of Program Evaluator

Executive Summary

Faculty members of Bacha Khan University Charsadda welcomed the committee members along with representatives of NAEAC, HEC. Thereafter, Dr. Salim Shah, Chairman, Department of Plant Breeding and Genetics briefed about the General activities of the University particularly Agriculture, followed by Dr Zahid Hussain, Chairman, Department of Agronomy who briefed the committee about Department of Agronomy, Bacha Khan University Charsadda which was started on July 03, 2012. AIC had detail meeting with all faculty members and under graduate students. Agronomy was the one of three departments in which 09 students opted in 5th and 22 students in 7th semester with a total of 31 students as their major in Fall 2014. Currently the Department has its own Chairman/HOD. The courses for degree programs offered by the department are those developed by the HEC constituted committee (NCRC) and adopted by the department, hence are in harmony with other public sector universities/institutions. The objectives of curriculum are clear and in accordance with the HEC guidelines. There are six faculty members in the Department under discussion, out of these six, five hold PhD degree, while one is M.Sc (Hons) degree holder. The pyramid as per recommendation (1:1:2:2) is incomplete which needs to be filled as early as possible. Moreover, availability of class rooms as per number of students, labs and offices is still needed. The availability of equipped labs (at least 2) for each, provision of IT facilities and teaching learning resources and demonstration/practical facility in the form of a moderately developed research area/farm is needed in short period of time. Presently, facilities of class practical are lacking. Facilities like laptop provision to students and scholarship/financial aid from different resources need to be streamlined with regular office/focal person in the university.

Introduction

The Bacha Khan University, Charsadda started in July 03, 2012 with B.S program in 9 disciplines including Management sciences, Computer sciences, English, Geology, Sociology, Mathematics, Chemistry, Biotechnology, Botany and Agriculture. Within Agriculture, three major departments' i.e Agronomy, Plant Breeding and genetics and Entomology were introduced in the University. Although University in general and Agronomy as major subject has made significant and visible progress. Intake of students for B.Sc (Hons) Agriculture progressively increased. Similarly, Agronomy major has progressed accordingly. Currently, 22 students are enrolled in 7th and 09 students are enrolled in 5th semester majoring in Agronomy.

The pyramid as per recommendation (1:1:2:2) is incomplete which needs to be filled as early as possible. Moreover, availability of class rooms as per number of students, labs and offices is still needed. The availability of moderately equipped labs (at least 2) for each, provision of IT facilities and teaching learning resources and demonstration/practical facility in the form of a well-developed research area/farm is needed in short period of time. Facilities like laptop provision to faculty/students and scholarship/financial aid from different resources need to be streamlined with regular office/focal person in the university.

CRITERION ANALYSIS

Criteria I: Strength and quality of Faculty

The Faculty members of the Department of Agronomy, at Bacha Khan University are capable of teaching and conducting research. All six teachers are young and qualified. They are able to teach and train the students to face future challenges. Presently, there are five Assistant professors and one lecturer. Five of them hold Ph.D and one is M.Sc (Hons) who is also enrolled in Ph. D. Range of experience of faculty members; vary from 1-2 years, whereas Chairman of Department has more than 3 years' experience in various universities. Department is running graduate program where the first batch will be graduated by spring 2015. Faculty members of the department are also rendering their services to the farmer community. There is a need of permanent/regular appointment of assistant professors, associate professors and professor to justify the work load and to fulfill the HEC criteria. The faculty is using available resources for teaching and evaluations, techniques such as quizzes, assignments, projects, seminars plus presentations. Evaluations for sessional, mid and final examinations are in operation. Dean and HoDs are there for monitoring the existing system. Participations of students in seminars and conferences are limited. Funds and facilities are not available for participation of faculty and students in seminars/workshop/conferences/symposium which provides opportunities of exchange of knowledge at national and international level and learning from experts in that specific field.

Faculty research publications in national (HEC recognized journals) and international journals are satisfactory but there is room for improvement. Contribution toward publication of books, chapters and proceedings and impact factor journals is also needed. Agronomy faculty have life time membership in Pakistan Society of Agronomy (PSA). Faculty perception about degree program is clear. The student teacher ratio is not good; however,

teachers can focus the students in a better way due to low strength of students and giving more session to question answer and presentations etc.

Criteria II: Curriculum Design and Development

The Department of Agronomy is focusing on already approved curricula which have been approved by the University Statutory Bodies such as Board of Studies, Board of Faculty, Academic Council and are placed on the agenda of Syndicate meeting to be held soon. So far, main focus of faculty is towards the teaching of 4 years B.Sc (Hons) degree program. The curriculum has been revised as and when need by the Department/Faculty as well as HEC. Curriculum is well defined with clear objectives. Still, there is continuous revision of the curricula for B.Sc (Hons). A few text and reference books are available. Availability of text books should be increased in the library which is catering the need of all the Campus. The budget for books is available for main library of the University and no budget for the department. A well developed and equipped with latest text and reference books library is needed at urgent basis for whole university. Similarly, a book bank in the department is also needed. Credit hours and contact hours are justified for existing staff. Course completion is a regular and encouraging process of this department.

All students (22 of 7th and 09 of 5th semester) of this department are well informed and fully aware about course program, admission policy, enrolment, withdrawal and course break up. However, it was felt that rules related to admission, course load in each semester should be written in some or other form available to students. Course files verified by the AIC are maintained but need some improvement that has been pointed out by the committee. QEC of the university exists and has evaluated teachers, course satisfaction, and teacher evaluation by the student. However, formal establishment of relevant office shall be done in due course of time.

Criteria III: Infrastructure and Learning Resources

A couple of lab facilities available which are being shared by all other departments of Agriculture for their practical classes and demonstration to the students. Size of lab is meant for small number of students, if enrollment increases these labs shall not be able to cater the needs. Class rooms are not enough for the working of students. There is need of fully equipped more departmental labs and class rooms. Equipment's available in lab are insufficient and need up- gradation. Supporting staff is insufficient and not fully trained. Practical work and write up of practical note books is good. Provision of better equipment in

lab as well at farm located at proposed University New campus close to motor way and trained supporting staff is urgent need of this department. Moreover, establishment of proper research farm shall be required for undertaking better research. The efforts for establishment of proper class rooms are being made by Administration. Similarly, transfer of funds for proper research farm are under way. However, securing of funds should be focused for early disbursement.

Criteria IV: Students Support and Progression:

Students actively participate in cultural, scientific, academic and welfare societies. In addition to Merit Fellowship, Mora scholarships and Fauji Foundation scholarships have been won by students which is good sign of student's progress and abilities. Out of the total enrolled student strength top most talented 1/3rd students have shown their interest in majoring Agronomy, which is another sign of future prospects of this department. Departmental admission to B.Sc. (Hons) is normal as per available facilities. Availability of academics guidance/counselling to students needs strengthening which at present is insufficient.

At present there are two hostels for male and one hostel for female students with a total capacity of 700 male and 100 female's students with good mess system are available. However, these facilities are insufficient to cater the need of students. The administration may plan to build that facility in near future. Limited transport and sport facilities for outdoor and indoor games are available. There is a good atmosphere for co-curricular activities having no students' political groups/federations. Students' cafeteria having male and female separate portions is available. Student attendance is being recorded regularly and there is restriction of 75 % presence record of attendance has been verified by the AIC as course files. First aid boxes and one ambulance are available. However, there is need for establishment of regular dispensary/hospital, provision of transport and improvement of computing facilities.

SWOT Analysis

Strength of Degree Program B.Sc (Hons)

- Qualified teaching faculty of six including five Ph.D but all assistant professors with 2-5 years modest teaching experience

Weaknesses of Degree Program B.Sc (Hons)

1. Grossly insufficient and un-furnished faculty offices, lecture rooms, laboratory, computer and library facilities.
2. Very limited IT facilities, lack of research and reference material and few text books.
3. Limited facilities for sports, extra –curricular and recreational activity.
4. Absence of well-developed and well equipped experimental farm.
5. Lack of exposure of students to other Universities, research institutions of the country.
6. The faculty although has number of Res. Publications, but, a few are recent ones and in HEC recognized and impact factor journals.

Opportunities for Degree Program

1. Trainings for capacity building of professionals and farmers would be possible in future.
2. Potential of targeted and specific crop targeted research i.e. tobacco, sugar cane, sugar beet, wheat, maize, rice and other agronomic crops.
3. Qualified and experienced faculty can provide consultancy services to national and international NGOs/donor agencies for sustainable agriculture development in the area.

Threats to Degree Program

1. University is located in remote area having no direct link with main road.
2. Security is a big threat to staff and students under present circumstances.
3. Lack of resources for running departmental matters independently.

Actionable Recommendations

- Completion of faculty pyramid i.e. Appointment of Professor/Associate Professor as soon as possible as per recommended of HEC 1:1:2:2.
- Infrastructure strengthening and up gradation like library, labs. Farm research area should be focused.
- Provision of at least three class rooms, seminar room, committee/conference room.
- Provision of IT facilities, access to HEC digital library, textbooks and reference material for the department.
- Allotment of “major” after 4th semester should be done purely on merit and as per student choice. Guidance and counselling to students should be provided in this regards by senior faculty.
- Provision of scholarship facilities should be advertised at prominent places for information of students.
- Field visits should be made part of practical as university does not have proper research farm.

Final Recommendations

The AIC assessed that degree program on agronomy hardly meets one (faculty) of the four major criteria for accreditation of the program with NAEAC.

Hence, on the basis of the detailed review, the agronomy program has been assigned 64% score and rated in category ‘Y1’ of HEC/NAEAC with the hope that it would improve in due course of time.

Faculty

| S/No | Name | Position | Univ. Experience (yr) |
|------|-------------------------|--------------------------------|-----------------------|
| 1 | Dr Zahid Hussain | Assistant Professor & Chairman | 5 |
| 2 | Dr Zafar Hayat Khan | Assistant Professor | 2 |
| 3 | Dr Wajid Ali Shah | ---do-- | 2 |
| 4 | Dr Roohul Amin | ----do--- | 2 |
| 5 | Dr Manzoor Ahmad | ---do--- | 2 |
| 6 | Mr Ali Sher M.Sc (Hons) | Teaching Assistant | PhD in progress |

Clerical Staff

| S/No | Name | Position |
|------|------------------|----------|
| 1 | Mr Manzoor Ahmad | KPO |
| 2 | Mr Fazli Khuda | UDC |

LIST OF BOOKS PERTAINING TO THE SUBJECT OF AGRONOMY

| S.No. | Auther Name | Book Name |
|-------|-------------|--|
| 1 | Kulkarni | Principles of seed technology |
| 2 | Nazir | Crop production |
| 3 | | Principles of Crop Production |
| 4 | | Sprinkler Irrigation |
| 5 | | Agronomy of Field Crops |
| 6 | | Weeds Management |
| 7 | | Sugar cane Ratoon |
| 8 | | Stable Food Production, Sustainable Agric. |
| 9 | | Seed Testing |

LIST OF EQUIPMENTS AVAILABLE IN THE LABS To BE USED in AGRONOMY

| S/#. | Particular | Capacity | Quantity |
|-------------|---|-----------------|-----------------|
| | Not a single equipment has been seen in labs. Moreover, the list provided by HoD does not contain any single item to be used for lab or field experiments. There were only flasks, beakers and other similar items. | | |

*Annexure-IV***FACULTY PUBLICATIONS, BOOKS, SEMINAR/CONFERENCES AND AWARDS**

1. Amanullah, Kakar, K.M., Khan, A., Khan, I., Shah, Z., & **Hussain, Z.** (2014). Growth and yield response of maize (*Zea mays* L.) to foliar NPK-fertilizer under moisture stress condition. *Soil Environ.*, 33(2): 116-123.
2. Amanullah, Shah, S., Shah, Z., Khalil, S.K., Jan, A., Jan, M.T., Afzal, M., Akbar, H., Khan, H., Rahman, H., Nawab, K., Farhatullah, Muhammad, F., **Hussain, Z.**, Kakar, K.M. & Khan, I. (2014). Effects of variable nitrogen source and rate on leaf area index and total dry matter accumulation in maize (*Zea mays* l.) genotypes under calcareous soils. *Turkish Journal of Field Crops*, 19(2): 183-191.
3. Amanullah, Ullah, M., Khan, I., **Hussain, Z.** & Kakar K. M. (2014). Phenomorphological Traits of Mungbean as Influenced by Phosphorous and Tillage under Irrigated and Un-irrigated Conditions. *Pure Applied Biology*, 3(2): 55-59.
4. Amanullah, Asif, M., Nawab, K., Shah, Z., Hassan, M., Khan, A. Z., Khalil, S.K., **Hussain, Z.**, Tariq, M. & Rahman, H. (2010). Impact of planting density and P-fertilizer source on the growth analysis of maize. *Pakistan Journal of Botany*, 42(4): 2349-2357.
5. Amanullah, Zakirullah, M., Tariq, M., Nawab, K., Khan, A. Z., Farhatullah, Shah, Z., Jan, A., Khalil, S. K., Jan, M. T., Sajid, M., **Hussain, Z.**, & Rahman, H. (2010). Levels and time of phosphorus application influence growth, dry matter partitioning and harvest index in maize. *Pakistan Journal of Botany*, 42(6): 4051-4061.
6. Amanullah, Khan, A., **Hussain Z.** & Dawood, J. (2010). Performance of wheat cultivars sown at different seeding rates under moisture stress conditions. *Archives of Agronomy and Soil Science*, 56 (1): 99–105. ISSN: 03650340.
7. **Hussain, Z.** & Leitch, M. H. (2008). Effects of foliar applied sulphur and commercial growth regulators in wheat. *Journal of Plant Nutrition*, 31: 1699- 1710.
8. **Hussain, Z.** & Leitch, M. H. (2007). The Effect of sulphur and growth regulators on growth characteristics and grain yield of spring sown wheat. *Journal of Plant Nutrition*, 30: 67 – 77.
9. **Hussain, Z.** & Leitch, M. H. (2005). The effect of applied sulphur on the growth, grain yield and control of powdery mildew in spring wheat. *Annals of Applied Biology*, 147: 49-56.

- 10 **Hussain Z.**, Khan, B. & Badshah, S. (1998). The effect of nitrogen, phosphorus and potassium on the oil yield of a sunflower hybrid. *Sarhad Journal of Agriculture*, Vol. 14. No. 4. ISSN: 1016-4383.
- 11 **Zafar Hayat Khan**, S.K. Khalil and F. Shah. Nitrogen and plant density influence growth and yield of sweet corn land races in northwest Pakistan. Paper accepted for publication in *Pak. J. Botany*. (**Impact 2010: 0.947**).
- 12 Kawsar Ali, S.K. Khan, **Zafar Hayat Khan**, N. Khan, M. Shahid and A. Rahman. Management of organic and inorganic nitrogen for different maize varieties. Paper accepted for publication in *Pak. J. Botany*. (**Impact 2010: 0.947**).
- 13 Farooq Shah, J. Huang, K. Cui, L. Nie, T. Shah, W. Wu, K. Wang, **Zafar Hayat Khan**, L. Zhu and C. Chen. 2011. Physiological and biochemical changes in rice associated with high night temperature stress and their amelioration by exogenous application of ascorbic acid. *Aust. J. Crop Sci.* On line. 5(13): 1810-1816. (**Impact 2010: 0.899**).
- 14 **Zafar Hayat Khan**, W.A. Shah, J. Bakht, M. Shafi and M.A. Khan. 2004. Performance of maize varieties under different seed rates. *Sarhad J. Agric.* 20(2):183-189.
- 15 Muhammad Shafi, **Zafar Hayat Khan**, J. Bakht, M.J. Khan and S. Anwar. 2006. Performance of maize varieties under different seed rates. *Sarhad J. Agric.* 22(1):23-26.
- 16 Abdul Qahar, P. Shah, **Zafar Hayat Khan** and Sayed M.A. Shah. 2006. Effect of chemical suckericides on yield and quality of FCV tobacco. *Sarhad J. Agric.* 22(2):194-197.
- 17 Nazim Hussain, A.Z. Khan, H. Akbar, N.G. Bangash, **Zafar Hayat Khan** and M. Idrees. 2007. Response of maize varieties to phosphorus and potassium levels. *Sarhad J. Agric.* 23(4):881-887.
- 18 **Zafar Hayat Khan**, H. Gul, H. Akber, K. Khan, M.Y. Khan, Ikramullah and F. Shah. 2008. Yield and quality of FCV tobacco as affected by different levels of Fico-micron and boron. *Sarhad J. Agric.* 24(2):211-216.
- 19 Abdul Basir, Z. Shah, M. Naeem, J. Bakht and **Zafar Hayat Khan**. 2008. Effect of phosphorus and farm yard manure on agronomic traits of chickpea. *Sarhad J. Agric.* 24(4):567-562.
- 20 Muhammad Israr, M.M. Shafi, N. Khan, N. Ahmad, S. Baig and **Zafar Hayat Khan**. 2009. Ecotourism in Northern Pakistan and challenges perspective of stakeholders. *Sarhad J. Agric.* 25(1):113-120.

- 21 **Zafar Hayat Khan**, S.K. Khalil, S. Nigar, I. Khalil, I. Haq, I. Ahmad, A. Ali, M.Y. Khan. 2009. Phenology and yield of sweet corn landraces influenced by planting dates. *Sarhad J. Agric.* 25(2):153-157.
- 22 Abdul Qahar, **Zafar Hayat Khan**, S. Anwar, H. Badshah and Hidayat-ullah. 2010. Nitrogen use efficiency of sunflower hybrids as affected by various nitrogen levels. *Biological Diversity and Conservation, Turkey.* 3(3):121-125.
- 23 **Zafar Hayat Khan**, S. Khan, Farhatullah, M.Y. Khan, M. Israr and A. Basir. 2011. Selecting optimum planting date for sweet corn in Peshawar-Pakistan. *Sarhad J. Agric.* 27(3):341-347.
- 24 Kawsar, Ali, S.K. Khalil, F. Munsif, A. Rab, K. Nawab, A.Z. Khan, A. Kamal and **Zafar Hayat Khan**. Response of maize to various nitrogen sources and tillage practices. *Sarhad J. Agric.* 28 (1): 9-14.
- 25 Kawsar, Ali, S.K. Khalil, A.Z. Khan, and **Zafar Hayat Khan**. Response of maize yield and yield components to tillage methods combined with inorganic N and organic manures. Paper accepted for publication in *Sarhad J. Agric.* 28 (1) 2012.
- 26 **Shah A.W**; Himayat K; Shazma A; K. Nawab (2011). Yield and yield components of wheat as affected by different seed rates and nitrogen level. *Sarhad J. Agric.* Vol. 27, No.1
- 27 **Shah A.W**; Himayat K; Shazma A; K. Nawab; A. Rahim and Mohib K, (2009). Effect of irrigation and nitrogen levels on the yield and yield components of wheat. *Sarhad J. Agric.* Vol. 25, No.3
- 28 **Shah A. W**; Bakht J, Tehseen U, A.K. Wahab, M. Zubair and A. A. Khakwani. (2006). Effect of sowing dates on the yield and yield components of different wheat varieties. *J. Agronomy* 5 (1): 106-110, 2006
- 29 Zafar, H K, **Shah. A. W**; Bakht J, Shafi M and Aman M K (2004). Performance of maize varieties under different seed rates. . **20**, No.2, 2004: 183-190
- 30 Tahir A K, Shazma A., **Shah A. W**; and Bashir A., 2004. Response of maize hybrids/ cultivars to various levels of Potassium and Irrigation frequencies. *J. Agronomy.* **3** (3) 201207, 2004
- 31 Shazma A., **Shah A. W**; Bakht J. and N. Jabeen (2003). Comparison of Sorghum Extracts Chemical and Hand Weeding Management in Wheat (*Triticum aestivum* L.) Crop. *J. Agronomy.* **3** (1): 59-67, 2004
- 32 Hussain. N., Shamsi, I., Khan, S, Akbar H. and **Shah A. W**; (2003). Effect of legume intercrops and nitrogen levels on the performance of maize. **2**(2): 242-246.
- 33 Hameed, E, **Shah A. W**; Shad A A, Bakht J and Muhammad T. (2003). Effect of different planting dates, seed rates and nitrogen levels on wheat. *Asian J. Plant Sci.* **2** (6): 464-474
- 34 Shamsi, I, **Shah A. W**; Bakht J, and Massod M. (2003). Effect of maize population (as intercrop) on the growth of ratoon sugarcane and maize yield. *Asian J. Plant Sci.* **2** (7): 532534

- 35 Mujtaba M., Shamsi, I.H, Hussain N. and **Shah A. W**; (2003). Performance of various levels of NP and different cultivars as affected on yield and yield components of maize. *Asian J. Plant Sci.* **2** (7): 535-538
- 36 M. A. Zarkoon, Khan M N, **Shah A. W**; Khan M A and Bakht J., (2003). Performance of wheat under different weed management practices at various growth stages. *Sarhad J. Agric.* **19**, No. 2:265-270
- 37 Nazim H., Shamsi, H I, Khan, S, Akbar, H, and **Shah A. W**; (2003). Effect of Nitrogen and Phosphorus Levels on the Yield Parameters of Sugarcane Varieties. *Asian J. Plant Sci.* **2** (12): 873-877, 2003
- 38 **Shah A. W**; Bakht J; Shafi, M and Khan, A. M (2002). Yield and yield components of different cultivars of wheat, oat and barley under rain fed condition” *Asian J. of Plant Sci.* Vol. **1**, No.2: 148-150.
- 39 Sabir S, Bakht J, Shafi M and **Shah A. W**; (2002). Effect of foliar Vs broadcast application of different fertilizer levels on barley. *Asian J. Plant Sciences* **1**: 213-215.
- 40 Ali J, Bakht J, Shafi M, Khan S and **Shah A. W**; (2002). Uptake of N by maize as affected by various combinations of N and P. *Pak. J. Agron.* **1**: 12-14
- 41 Muhammad S, Bakht J, Jan T, **Shah A. W**; and Khan PK. Response of various maize varieties to different levels of NP at Peshawar valley. *Sarhad J. Agric.***18**: 17-25
- 42 Sabir S, Bakht J, Shafi M and **Shah A. W**; (2002). Effect of foliar VS broadcast application of different fertilizer levels on wheat. *Asian J. Plant Sciences* **1**: 300-303.
- 43 Ullah A, Bakht J, Shafi M and **Shah A. W**; (2002). Effect of irrigation levels on the yield and yield components of Chick pea. *Asian J. Plant Sciences* **1**: 355-357.
- 44 Ali J, Bakht J, Shafi M, Khan S and **Shah A. W**; (2002). Effect of various levels of N and P on the yield and yield components of maize. *Asian J. Plant Sci.***1**: 367-369.
- 45 Hamid E, Taj FH, Bakht J, **Shah A. W**; and Shad AA (2002). Effect of different planting dates, seed rates and nitrogen levels on wheat. *Asian J. Plant Sci.* **1**: 502-506.
- 46 Islam Z, Bakht J, Khan S and **Shah A. W**; (2002). Frequency of various N levels, lodging and seed quality in wheat. *Asian J. Plant Sci.* **1**: 510-512.
- 47 Khan A.I, Bakht, J, **Shah A. W**; Khan N.M. and Ullah I (2002). Effect of seed rate on the yield and yield components of wheat under irrigated conditions of Peshawar. *Asian J. Plant Sci.* **1**: 513-515.
- 48 Shahzad, K. Bakht J, Shafi M, **Shah A. W**; and Jabeen, N (2002). Yield and yield component of various wheat varieties as affected by different sowing dates. *Asian J. Plant Sci.* **1**: 522-525.
- 49 Muhammad, S., Bakht, J, Jan T, **Shah A. W**; and Khan N P (2002). To study the effect of different fertilizers levels and varieties to maize”. *Sarhad J. Agric.* **18** (3); 251-257.
- 50 Khan A M, Hassan G, **Shah A. W**; and Afridi, Z, (2002). Duration effect of weeds competition on the yield and yield components of maize. *Sarhad J. Agric.* **18** (3); 335-337
- 51 Khan M A, Marwat K B, Hassan G. and **Shah A. W**; (2002). Effect of different weed free periods on the growth and yield of wheat. *Pak. J. Agric. Engg., Vet. Sci.* **18** (1-2) 2002.
- 52 **Shah A. W**; Bakht J, Khan M A and Shafi M. (2002). Effect of weed management at various growth stages on the yield and yield components of wheat. *Pak. J. Weed Sci. Res.* **9** (1-2): 41-48, 2003
- 53 **Shah A W**; Bakht, J, Shafi, M and Khan, A. M (2001). Forage performance of different cultivars of wheat, oat and barley under rain fed condition” *Pak. J. Bio. Sci.* Vol. **4**: 516- 518.