CURRICULUM VITAE

l. NAME NATIONALITY AND SOCIAL STATUS:

Name: Magzoub Omer Bashir.
Age: 75.
Nationality: Sudanese.
Social Status: Married.

ll. QUALIFICATIONS:

1. B.Sc. Agriculture (Hon.), University of Khartoum 1966.
2. M.Sc. Agriculture, Crop Protection, University of Khartoum 1969.
3. Ph.D. Entomology, University of California, Berkeley 1974.

lll. ACADEMIC STATUS:

Lecturer, 1974.
Associate Professor, 1984.
Professor of Entomology, 1993.

lV. EMPLOYMENT:

University of Khartoum, Khartoum, Sudan, up to 1994
Seconded to work with the International Centre of Insect Physiology and Ecology, Nairobi, Kenya. In charge of ICIPE field station located at Port Sudan, Sudan
In collaboration with the Plant Protection Directorate, of the Federal Ministry of Agriculture and Forestry.

V. CURRENT ADDRESS:

Department of Crop Protection,
Faculty of Agriculture,
University of Khartoum,
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VI. TEACHING EXPERIENCE:

I have spent 22 years in teaching since my appointment as lecturer in 1974. Prior to that and as a senior scholar during the period 1966-1969 I taught practical courses in agricultural zoology, entomology and crop protection.

As a lecturer after obtaining the Ph.D. from the University of California, Berkeley in 1974, I have revised and taught the following courses at the Faculty of Agriculture, University of Khartoum.

1. Agricultural Zoology 21 for Part II.

2. Agricultural Zoology 22 for Part II.

In these two courses I developed and elaborated areas of agricultural relevance in he form it is taught now.

3. Entomology for Part V, where in this insect ecology course, I developed the part dealing with natural control of insects to include biological control of insect pests and weeds.

4. Crop Pests and Diseases for Part V, where I suggested the introduction of the part dealing with soil pests, compiled and taught this part since 1975.

5. Apiculture 1n 1989 in the absence of the colleague who used to teach this course.

6. Entomology 31 in collaboration with another member of the department.

7. Crop protection 41 in collaboration with another member of the department.

This indicates that I have practically taught either all or part of every entomology course offered in the department except the pesticides course.

VII. RESEARCH WORK:

i. Nature of research:

My main field of research work is the ecology oriented natural biotic and applied biological control of insects and weeds. The first part deals with identification, study,

evaluation and attempts to enhance the efficiency of indigenous natural enemies of major insect pests and weeds. The second part deals with the importation, screening and releasing of exotic natural enemies so as to control pests of foreign origin and native pests whose natural enemies fall short of affecting the desired economic level of control.

This type of research work is meant to facilitate sound use of biotic agents either alone or integrated with other appropriate and non disruptive measures in the control strategies of pestiferous species. It also aims at the conservation of the integral components of natural and agro-ecosystems through the avoidance of unnecessary and non-judicious use of pesticides.

In the area of naturally occurring biotic control, I have investigated natural enemies of alfalfa pests. From these studies, recommendations as to means and ways of enhancing the efficiency of some of the resilient biotic control agents of alfalfa pests was made. I also investigated the prevalence and efficiency of the natural enemies of scale insects and Striga. Similar studies on the natural enemies of store pests (The pulse and ground nut weevils), date palm scale insects, cotton pest (Aphids, white flies and the American bollworm), Striga, grasshoppers, the tree locust and the millet head worm were made by graduate students under my supervision. Other investigations include biology, ecology and control of the sorghum shoot fly and development of mass-culturing techniques of natural
enemies and their hosts or preys.

In the area of applied biological control, I have imported, screened and released three natural enemies (Two weevils and one moth) to control water hyacinth. This effort started in 1978 and by 1980 the three species were established and achieved the first successful case of water hyacinth biocontrol. The success of this project have saved millions of hard and local currency annually spent on the purchase of herbicides and other logistics of the control campaigns. To this, is added the invaluable gain of ridding the Nile ecosystem from hordes of ecological problems created by the pollution effect of a number of herbicides.
Since 1980 and until now not a single Dinar is spent to combat this weed in the Sudan. This classical case of biological control is well known and reputed in Africa and other continents.

I also directed the execution of the biocontrol of the date palm scale insects as requested by the Ministry of Agriculture Animal Wealth and Natural Resources. In this project one exotic predator (*Chilocorus bipustulatus*) was imported from France, successfully mass-cultured and released against the date palm white scale insect in the Northern State. The species was successfully established and is now exerting appreciable biotic pressure on this pest. This endeavor integrated with the suitable cultural practices which we suggested and tested in collaboration with the regional horticulture and extension departments has saved the region from unnecessary monetary and ecological expenses that would have occurred if the previously intended use of pesticides was executed.

I am also concerned with the biocontrol of Striga through the redistribution of promising indigenous biocontrol agents. Of these, three borer species are so far reported only from the Nuba Mountains of Sudan. Two are *Smicronyx* spp. (stem and root borers) and the third is a shoot boring *Ophiomyia* sp. (different from O. *strigalis* which is crown and root miner). These promising biocontrol agents are now moved to other parts of the country and their impact on *Striga* is being evaluated. Beside this the other known natural enemies of *Striga* are evaluated and their efficiency as biocontrol agents accessed and compared with their potentials reported from other parts of the world.

I am now involved in research on the ecology of the Desert Locust. In this area I have so far accomplished the following tasks:-

1. Completed the established of the field station at the Red Sea Coast (RSC). The station consists of a guest hose facility, laboratory, and insectary for solitary and gregarious locusts, a one hectare farm and meteorological station.
2. Compiled analyzed and charted historic data of out breaks in the RSC for the building of a D-base, a prerequisite for modeling and delineation of high frequency breading areas (FBAS).
3. Monitoring of DL through light traps and conventional methods assessed, timing & conditions of optimum catches delimited.
4. Fauna and flora associated with DL in different biotopes identified.
5. Role of the most important host plants in the life system of DL investigated through life tables data analysis. *Heliotropium* spp.were found to be the most important food/shelter plant for solitary locusts.
6. Tests on 2 components of the gregarious mature adult established that one component Phenyl Aceto Nitrile (PAN) is of potential use in managing the behaviour of gregarious nymphs, intensifying cannibalism among crowded nymphs and in control tactics in conjunction with other control methods as it predisposes nymphs to sub-lethal dosages of pesticides and predation. Under field conditions PAN was proven to effect dispersal of marching bands and dispersed them to a higher toll from predation by bards.
7. Conducted exhaustive tests on the fungus *Metarhizium acridum* which ended in its registration for use as a safe and environment friendly control tool against the desert locust.
8. Conducted exhaustive tests on the adult pheromone (PAN) which ended in its registration for use as a safe and environment friendly control tool against the desert locust.

ii. Published research:

So far I have published 44 scientific papers in symposia, conferences, refried journals and participated in the publishing of one book dealing with *Striga*.

1. Bashir, M.O. and Venkatraman T.V. (1968). Insect parasite complex of berseem armyworm *Spodoptera exiqua* (HUBN.) (Lepidoptera: Noctuidae). *Entomophaga* 13 (1):151-158.

2. Ayed, I.A. and Bashir, M.O. (1976). A date palm disease syndrome in the Sudan. Proc. 19th Erkowit Conference. School Extra Mural Studies, U. of K. 1976.

3. Bashir, M.O. (1977). Pesticide pollution, effect on birds, Proc. 19th. Ann. Conf. Philos. Soc. Sudan. pp. 68-92.

4. El Tigani, K.B. and Bashir, M.O. (1978). Control of aquatic weeds. Proc. Symp. Crop Pest Manag. Ministry of Agric. and Irrigation 1978.

5. Bashir, M.O. (1979). Screening of *Neochetina eichhorniae* for biological control of water Erkowit Conference. School Extra Mural Studies, U. of K. 1976.

6. Habish, A.H. Bashir, M.O. Shawkat, A.B. and Waleed, A. (1980). A study of pests and diseases of sugar beet in Arab countries. Arab Org. for Agric. Dev. and Arab Sugar Fed. Publication No. 633/6. 114 pp. (in Arabic).

7. Bashir, M.O. (1982). Water hyacinth management by natural enemies in the Sudan. Proc. 2nd. Ann. Conf. Res. Agric. Dev. Ministry of Agriculture and Natural Resources, Southern Region, Juba. 1982.

8. Irving, N.S. and Bashir, M.O. (1982). Introduction of some natural enemies of water hyacinth to the White Nile, Sudan. *Tropical Pest Management*, 28(1): 20- 26.

9. Bashir, M.O., El Abjar, Z.E. and Irving, N.S. (1984). Observations on the effect of the weevils *Neochetina eichhorniae* Warner and *Neochetina bruchi* Hustache on the growth of water hyacinth. *Hydrobiologia*, 110: 95-98 Lemnology and Marine Biology in the Sudan.

10. El Abjar, Z.E. and Bashir, M.O. (1984). Biology and Life Tables of Neochetina *bruchi* Hustache (Coleoptera: Curculionidae) introduced to the White Nile, Sudan for the Biological Control of Water Hyacinth. *Zeitschrift fur angewandate Entomologie*, 97: 282-286.

11. Bashir, M.O. and Musselman, L.J. (1984). Some natural enemies of *Striga hermonthica* BENTHAM in the Sudan. Tropical Pest Management, 30(2): 211- 212.

12. Bashir, M.O. (1984). The establishment and distribution of natural enemies released against water hyacinth in the Sudan. Tropical Pest Management, 30 (3): 320-323.

13. Bashir, M.O. and Bennett, F.D. (1984). Biological Control of water hyacinth on the White Nile, Sudan. Proc.VI Int. Symp. Biol. Cont. Weeds, Vancouver 1984, 491-496.

14. Bashir, M.O. (1987). The potential for biocontrol of witch weeds. 183-206. In parasitic Weeds in Agriculture, Volume I, Striga, Ed. Musselman, L. J. CRC Press,

Inc. Boca Raton, Florida, 317 pp.

15. Bashir, M.O. (1989). Biological control, prospects against locusts and grasshoppers. 103-113, in AOAD, Publication/89/RG/0057, 249 pp. (In Arabic).

16. El Abjar, E.Z. and Bashir, M.O. (1989). A new strain of *Trioxys complanatus* Quilis parasitizing the spotted alfalfa aphid in the Sudan. Tropical Pest Management 35 (3): 335-336.

17. Bashir, M.O. (1990). The impact of biocontrol agents of water hyacinth in the Sudan. Proceedings of the International Study Workshop on Newer Methods in the Isolation, Characterization and Evaluation of Biopesticides. USA NRC, BOSTID and ICIPE, Nairobi, Kenya, April 1990.

18. Bashir, M.O. and El Abjar, Z.E. (1991). Biological control, implementation, experience and future prospects in the Sudan. Proceedings of the workshop on the implementation of the international code of conduct on the distribution and use of pesticides, Khartoum, 15-19 September 1991.

19. El Tayeb, N.M. and Bashir, M.O. (1992). Evaluation of *Alternaria eichhorniae* as a biocontrol agent of water hyacinth in the Sudan. Proceedings of the French-Sudanese Symposium on Phytopathology. INRA and ARC, ARC, Wad Medani, Sudan, 21-24 November 1992.

20. El Abjar, Z.E. and Bashir, M.O. (1992). First record of an *Aphelinus* species parasitizing *Aphis gossypii* Glover. U.K. J. Agric. Sci. 1: 125-134.

21. El Abjar, Z.E. and Bashir, M.O. (1993). Notes on population dynamics of the spotted alfalfa aphid *Therioaphis trifolii* (Monell.) from *maculata* (Buck.). Plant Protection Directorate Bulletin, 2: 8-20.

22. Bashir, M.O. and El Abjar, Z.E. (1993). Notes on the biology of *Trioxys complanatus* Quilis parasitizing the spotted alfalfa aphid in the Sudan. *Elbahith*, 4: 6-26.

23. Bashir, M.O. and Sorkati, I. (1993). Effect of the desert locust on range vegetation in the Red Sea State (competitive consequence with small and large ruminants). In Proceedings of Symposium on desertification management, Jeddah, Saudi Arabia.

24. El Abjar, Z.E. and Bashir, M.O. (1996). Studies on the life tables data of *Aphis gossypii* Glover. Plant Protection Directorate Bulletin, 3 (2): 18-30.

25. Bashir, M. O. (1995). Natural Enemies of locusts and their potential use as biocontrol agents. Univ. of Juba, The Association of Arab Research Councils and The Sudanese National Research Center, Khartoum, 3-5, October 1995.

26. Bashir, M. O. (1995).Preliminary investigations on to effect of a component of the desert locust adult gregarisation pheromone on gregarious nymphs. Symposium on the role of Research in the integrated biological control of the desert locust. Univ. of Juba, The Association of Arab Research Councils and The Sudanese National Research Center, Khartoum, 3-5, October 1995.

27. Bashir, M. O., Hassanali, A. and Rai, M. M. (1995). Cannibalism among desert locust nymphs under stress. Poster presentation at ESA, Las Vegas, 17-22 December 1995.

28. Bashir, M.O. Sorkati, I.A. and Hassanali, A., (1993). The effect of the desert locust (*Schistocerca gregaria* (Forskål) on the productivity of rangeland vegetation in the Red Sea Coast of the Sudan and its population management through environment friendly control tactics. In: Squires, V. R. & Sidahmed, A. E., (ed), Drylands: Sustainable use of rangelands into twenty-first century. IFAD SERIES: Tech. Rep., pp. 321-328.

28. Bashir, M. O., Hassanali, A. Njagi, P. G. N. Obeng-Ofori,D.and Torto, B.(1998).Gregarisation –disrupting factors in a novel approach of controlling locusts and grasshoppers. In Patent Applications Bull, 35:25-35. Nairobi, Kenya

29. Hassanali, and Bashir, M. O: (1999). Insights for the management of different locust species from new findings on the chemical ecology of the desert locust. *Insect Science and It's Application*. 19 (4), 369-376.

30. Bashir, M. O., Hassanali, A. and Rai, M. M. (2000).Changing oviposition preference Of the desert locust suggests a strong species predisposition for gregarisation. J. Chem. Ecol. 26:1721-33.

31. Abd Elrahim, M. A., E.Elhassan,S,M. and Bashir,M.O.(2004).Infectivity of *Metarhizium flavoviride* Gam & Roszypal to the Gregarious Nymphs of *Schistocerca gregaria* (Forskål) and the Enhancing Effect of Phenylacetonitrile on Mortality . U. of K. J. Agric. Sci.12(2) 196-206.

32. Abd Elrahim,M.A., E.Elhassan,S,M. and Bashir,M.O.(2006). Comparative efficacy of Blastospores and conidia of Metarhizium anisopliae var. Acridum IMI 330189 in the control of the Desert Locust. U. of K. J. Agric. Sci.14(1) 88-103.

33. Abd Elrahim,M.A., E.Elhassan,S,M. and Bashir,M.O.(2007). Effect of medium additives on yield and virulence of Blastospores of Metarhizium anisopliae var. Acridum for Desert Locust control. U. of K. J. Agric. Sci.15 (3) 418-429.

34. Hassanali, A., Bashir M.O., Njagi, P. G. N. and Sidi Ould Ely, (2005). Desert locust gregarisation: a conceptual kinetic model. Journal of Orthoptera Research 14(2), 223-226.

35. Hassanali, A., Njagi, P. G., and Bashir, M. O: (2005). Chemical ecology of locusts

And Related acridids. Ann. Rev. Entomol.50:223-245.

36. Bashir, M. O., and Hassanali, A.(2010). Novel cross-stage solitarising effect of gregarious-phase adult desert locust (*Schistocerca gregaria* (Forskål)*)* pheromone on hoppers. Journal of Insect Physiology. 56 : 640-645.

37. Hassanali, A., Bashir M.O., Njagi, P. G. N. and Sidi Ould Ely, (2005). Desert locust gregarisation: a conceptual kinetic model. Journal of Orthoptera Research 14(2), 223-226.

38. Hassanali, A., Njagi, P. G., and Bashir, M. O: (2005). Chemical ecology of locusts and Related acridids. Ann. Rev. Entomol.50:223-245.

39. Abd Elrahim,M.A., E.Elhassan,S,M. and Bashir,M.O.(2006). Comparative efficacy of Blastospores and conidia of *Metarhizium anisopliae* var. *Acridum* IMI 330189 in the control of the Desert Locust. U. of K. J. Agric. Sci.14(1) 88-103.

40. Ould Ely, S., Mahamat, H., Njagi, P.G.N., Bashir, M. O., El-Tom El-Amin, S., Hassanali, A. (2006). Mate location mechanism and phase-related mate preferences in solitarius desert locust, Schistocerca gregaria. Journal of Chemical Ecology 32 (5), pp. 1057-1069.

41. Abd Elrahim,M.A., E.Elhassan,S,M. and Bashir,M.O.(2007). Effect of medium additives on yield and virulence of Blastospores of *Metarhizium anisopliae* var. *Acridum* for Desert Locust control. U. of K. *J. Agric. Sci*.15 (3) 418-429.

42. Rono, E., Njagi, P.G.N., Bashir, M.O., Hassanali, A. (2008). Concentration-dependent parsimonious releaser roles of gregarious male pheromone of the desert locust, Schistocerca gregaria. Journal of Insect Physiology 54 (1), pp. 162-168

43. Bashir, M. O., and Hassanali, A.(2010).Novel cross-stage solitarising effect of gregarious-phase adult desert locust (*Schistocerca gregaria* (Forskål)*)* pheromone on hoppers. Journal of Insect Physiology. 56 (2010) 640–645.

44**.** Ould Ely, S., Mahamat, H., Njagi, P.G.N., Bashir, M. O., El-Tom El-Amin, S., Hassanali, A. (2011). Diel Behavioral Activity Patterns in Adult Solitarious Desert Locus, S*chistocerca gregaria* (Forscal). *Psyche*, Hindawi Publishing Corporation, 2011, Article IO 459315, 9 Pages.

45. Phiri, G., L. Navarro, M. Bashir, C. Cilliers, O. Diop, Y. Fayad, and A. Khattab. (2000). Key issues emerging from surveys and case studies. In L. Navarro and G. Phiri (eds.) Water-hyacinth Management Capability in Africa and the Middle East: A Survey of Problems and Solutions. IDRC http://www.idrc.ca/acb/showdetl.cfm?&DID=6&Product_ID=573&CATID=15

46. Mohamad, M. M., Elshafie, H.A., and Bashir, M.O. (2011). Use of Teflubenzuron alone and combined with *Metarhizium anisopliae* and Phenyacetonitrile as control agent against the Desert Locust Schistocerca gregaria (Forskal) (Orthoptera: Acrididae). *Agric. Biol. J. N. Am*. 2 (9):1293-1303.

47. Ould Etheimine, M., Bashir, M. O., Ely, S.,; Ould Mohamed, S., Ould Babah, M. A., Cherif1, K. and Mounsif, B.(2013). Effect of vegetation height and cover on the efficacy and residual effect of Metarhizium acridum conidia used in control tactics against the Desert Locust nymphs (Schistocerca gregaria) (Forskål). U. of K. J. Agric. Sci.21 (2) 211-2013.

48. Magzoub, O. B., Hassanali, A., Korena, H. H., and Bashir, A. W. (2014). Boma Trials on the Use of the Gregarious-Adult Pheromone Phenylacetonitrile of the Desert Locust *Schistoceca gregaria* (Forskål, 1775) and *Metarhizium acridum* in the management of Nymphs. U. of K. *J. Agric. Sci*.22 (1) 64-83.

49. Ould Etheimine, M., Bashir, M. O., Ely, S.,; Ould Mohamed, S., Ould Babah, M. A., Cherif1, K. and Mounsif, B.(2013). Efficacy and persistence of *Metarhizium acridum* (Hypocreales: Clavicipitaceae) used against desert locust larvae, *Schistocerca gregaria* (Orthoptera: Acrididae), under different vegetation cover types. *International Journal of Tropical Insect Science* Vol. 34, No. 2, pp. 106–114, 2014.

iii. Papers with Refries for Publication

1. Bashir, M. O., and Hassanali, A. Boma trials on the use of the Desert Locust adult pheromone for the management of marching bands. Journal of Insect Physiology.

2. Bashir, M. O., and Hassanali, A. Real field application of the Desert Locust adult pheromone as a new control tactic of the Desert locust gregarious nymphs. Journal of Orthopteran Research.

3. Bashir, M. O., and Hassanali, A. and Badr, E.S. Ecotoxicology studies on PN and PAN /GM combinations. Journal of Chemical Ecology.

iv. Papers Presented for Publication

1. Effect of the Desert Locust nymph pheromone blend on the reproductive physiology of mature adults. Journal of Orthopteran Research, September, 2013.

2. The role of *Heliotropium* species in the life system of the Desert Locust *Schistocerca gregaria* (Forskål) Insect Science and its Application. October, 2013.

v. Papers in Preparation

1.Dahab,A.A‹ and Bashir,M.O. Effects of Desert Locust adult aggregation pheromone alone, and integrated with fractional doses of Carbosulfan on target Desert Locust and non-target tenebrionid species in Cages.

2. Dahab, A.A‹, Bashir, M.O. and Hassanali. An assessment of biological and chemical Desert locust control agents on ground –dwelling arthropods in Red Sea Costal area, Sudan Using present absent sampling method

vi. Reports:

I have also submitted the following technical reports and project documents:

1. Project on the Biological Control of Water Hyacinth in the Sudan (Requested by NCR, PPD and the German GTZ).1976.

2. Quarantine and Insectary Facilities (justification, design and cost). Requested by NCR). 1977.

3. A report on insect releases in Kosti area and the Southern Region (Submitted to NCR and PPD). 1978.

4. Testing of Skima 4 Hovercraft in the Southern Region for insect distribution and surveys in connection with the biological control of water hyacinth. (Submitted to NCR and PPD). 1978.

5. Project on the Biological Control and Utilization of Water Hyacinth in the Sudan. (Requested by NCR and the Ministry of Agriculture and Irrigation to submit to international organizations) 1981.

6. Use of the Fungus *Metarhizium anisopliae* Var *acridum* in the control of locusts with reference to schistoceca gregaria (Forscal) and Locusta migratoria migratoriodes (R. & F.). The 70th. Meeting of the Pests and Disease Committee May 2004.

7. Use of the adult gregarization pheromone Phenyl Aceto Nitrile (PAN) in the control of the Desert Locust Schistoceca gregaria (Forscal).
The 72nd. Meeting of the Pest and Disease Committee.

8. Annual Reports, Water Hyacinth Biological Control Project (7 reports for the period 1977 - 1984) (Submitted to NCR and Ministry of Agriculture and Irrigation).

9. A project on the Biological Control of *Striga hermonthica* in the Sudan. Requested by the Striga Project. 1983.

10. A survey of Parasitic Weeds and some other pests in the vicinity of Juba, Yei and Upper Talanga 21-29 March 1983 by L.J. Musselman and M.O. Bashir.

11. *Striga* survey in the Vicinity of Kadugli, South Kordofan. 1983 by L.J. Musselman and M.O. Bashir.

12. A. Project on the Study, Assessment and Control of Pests and Diseases of Date Palm in the Sudan. 1983 Requested by the Ministry of Agriculture and Irrigation and FAO.

13. A Report on Pests and disease problems in the vegetable farm of the Arab Authority for Agricultural Development and Investment at Umdom, Khartoum, Sudan 1985.

14. A project on the biological control of the date palm scale insect *Parlatoria blanchardii* in the Northern Region of Sudan, submitted to Sudanese NCR and FAO 1985.

15. Project on the study and control of pests that cause cotton lint stickiness, 1988. Requested by the Sudan Cotton Marketing Corporation.

16. Plan of operation for the Sudanese German Services for Fruit and Vegetable Farmers Project, in collaboration with the project Manager, Dr. El Wasila Gadura and Amin Hussen 1988.

17. Three annual reports to the Sudanese German Services for vegetable and Fruit Farmers on the progress of the biological control of the date palm scale insects during 1988-1991.

18. Three reports (1990) to UNDP, ADS on proposals for integrated pest control in their areas of activities in the Sudan.

19. A project on the study and development of the natural enemies of locusts and grasshoppers, (1990). Presented to the team leader of the locust and grasshoppers control project, Sudan as requested by FAO.

20. Field Ecology Research Proposal on the Desert Locust at the Red Sea Coastal Region of the Republic of the Sudan. Requested by ICIPE, Nairobi, Kenya 1991.

21. Research recommendations on the control of insect pests and diseases of vegetables and fruits in the Sudan (1991). Requested by the Sudanese German

Integrated Services for Vegetable and Fruit Farmers. (Report translated to Arabic and information printed in pamphlets to distribute to farmers).

22. Plan of Operation for the Sudanese German Services for Fruit and Vegetable Farmers Project, Proposal for phase III, in collaboration with the project Manager Dr. Elwasila Gadura 1992.

23. Over 15 reports submitted to FAO and IFAD on the development of the field research work on the desert locust at the ICIPE field research station at the Red Sea Coast, Port Sudan, Sudan, during the period January, 1994 to April, 1996.

24. Report on the situation and management strategies of the red locust (*Nomadacris septemfasciata*) in Botswana and Namibia Caprivi strip. Presented to the GTZ, 1998.

25. In collaboration with Professor Ahmed Hassanali and members of the Department of Chemical Ecology drafted and presented the proposal on the development of semiochemicals-based management strategies for the desert locust 2002.

VIII. TRAINING OF POST-GRADUATE STUDENTS:

I have suggested and supervised the research work of 19 M.Sc. students and three Ph.D. candidates who all successfully obtained their degrees.

I am now supervising the research work of three Ph.D. and 6 M.Sc. candidates. The topics investigated by these candidates deal with insect ecology particularly population dynamics of pests and their natural enemies. New areas include investigations on the desert locust ecology and the role of semiochemicals in its life system.

A. Completed Work.

1. Abdalla, S. M. (1983) M.Sc.
   Studies on *Carydon serratus* (Coleoptera: Bruchidae) a pest of stored ground nuts in the Sudan.
   Host finding, fecundity and oviposition behaviour on different types of hosts. Effect of host physical condition, storage time and curing on the reproductive and population parameters using rm as an index.

2. Abu Zinid, I. M. (1982) M.Sc.
   The biotic natural control components of *Callosobruchus maculatus* (F) (Coleoptera, Bruchidae).
   Life tables data analysis of the pulse weevil *C. maculatus* and two of its parasites. Analysis of behaviour, host finding and host acceptance processes. Evaluation of parasites efficiency as biocontrol agents.

3. Adam, A. M. (1978) M.Sc.
Life tables data analysis of *Aphis craccivora* Koch (Homoptera: Aphididae) and two of its natural enemies.
Life tables data analysis of *A. craccivora* and its two main predators *Coccinella undecimpunctata* L. and *Adonia variegata* (Goeze). Feeding behaviour and feeding rates of the two predators. Use of the intrinsic rate of increase as an index in the evaluation of the two predators as biocontrol agents.

4. Ahmed, A.O. (1985). M.Sc.
Natural enemies of *Striga hermonthica* (Del.) Benth. In the Sudan with special reference to *Junonia orithya* (L.) (Lepidoptera): Nymphalidae). Survey and identification of insect natural enemies of *Striga*. Evaluation of damage and layout of criteria for the choice of promising biocontrol candidates. Life tables data analysis and use of rm as an index for the evaluation of promising candidates.

5. Ahmed, E.M. (1982) M.Sc.
Biological studies on *Neochetina eichhorniae* (Coleoptera: Curculionidae) an introduced natural enemy of water hyacinth.
Life tables data analysis of N. eichhorniae. Host specificity determined through starvation, paired plant feeding tests and group feeding tests. Efficiency of the species as a biocontrol candidate based on the assessment of damage inflicted by larvae, adults and various population levels.

6. Ali, G.A. (1983). M.Sc.
Ecological studies on *Heliothis armigera* (Hb.) (Lepidoptera: Noctuidae)._
Life tables data analysis of *Heliothis*. Host preference, host finding and acceptance, Evaluation of the impact of natural enemies on the population density.

7. El Abjar Z.E. (1981) M.Sc.
Biology and feeding behaviour of *Neochetina bruchi* (Hustache) (Coleoptera: Curculionidae) and its effect on water hyacinth. Life tables data analysis. Feeding behavior and host preference tests. Efficiency and impact of different levels of stocked larvae and adult population of N. bruchi on the biotic potential of its host.

8. El Abjar, Z.E. (1985). Ph.D.
Studies on the parasites of *Aphis gossypii* Glover and Therioaphis trifolii (Monell.) from maculata (Buck.).
Survey, identification and description of new species of primary and hyper parasites. Evaluation of host, parasite, hyper parasite interaction and key factor analysis. Study of behavior of parasites, host finding and acceptance. Effect of parasitization on density and spatial distribution of hosts. Design of a simple model
for host parasite interaction. Use of model (with biotic and abiotic driving variables) for preliminary prediction and forecast of infestations.

9. El Fahal, O.A. (1986). M.Sc.
   The biology, ecology and efficiency of *Scymnus levailanti* (Muls.) an aphid predator in Sorghum fields. Life tables data analysis. Host finding, acceptance and preference. Evaluation of predation in the stabilization, control, spatial distribution and colony size and shape in aphids.
10. El Siddig, A.B. (1992). M.Sc.
    Study and control of insect pests that cause cotton lint stickiness. Population dynamics of white flies and aphids on cotton in the White Nile cotton schemes. Evaluation of damage as reflected in cotton quantity and quality. Use of water, yeast and Neem extract sprays in the control of these pests. Evaluation of the effect of these practices on the population density of the pests and their natural enemies compared with the conventional pesticide control practices.

11. El Tayeb, N.E. (1990). Ph.D.
    Study and evaluation of some endemic pathogens as biocontrol agents of water hyacinth in the Sudan. Survey collection and identification of pathogenic fungi. Characterization, description, taxonomy and nomenclature of new species. Use of leaf cohort life tables data as a new method for the analysis of the population and reproductive parameters of a weed. Evaluation of pathogenicity of fungi through the use of host rm obtained from leaf cohort mortality data as an index. Extraction and refining of specific fungi toxins and their use in the control of water hyacinth.

12. Gafar, H.M. (1992). M.Sc.
    Studies on *Cybocephalus dudichi* A Predator of Diaspin Scale Insects in the Sudan.
    Life tables data analysis, and evaluation of the efficiency of *Cybocephalus dudichi* in the control of *Parlatoria blanchardii*. Life tables data analysis of *Parlatoria* and its predator *S. dudichi*. Study of prey stage preference and evaluation of predator efficiency through study of feeding rates, survival rate and fecundity under different levels of prey or food regiments.

13. Ibrahim, I.M. (1989). M.Sc.
    Studies on Life Tables, Ecology and Efficiency of the Aphidophagous Coccinellid *Cheilomens Vicina* (Muls.) Coccinellidae: Coleoptara.
    Life tables, ecology and efficiency of the aphidophagous coccinellid *Cheilomenes vicina* (Muls.) (Coleoptera: Coccinellidae). Life table data analysis of prey predator system. Prey finding, prey preferences and feeding behavior. Use of rm as an index to evaluate prey preference. Effect of predator density on aphid defensive mechanism and spatial distribution.

14. Mohamed, A.E. (1988). M.Sc.

Life tables data analysis and efficiency of *Chrysoperla carnea* Walk. (Neuroptera: Chrysopidae). Life tables data analysis Effect of prey species on the reproductive and population parameters of *C. Carnea.*

15. Mohamed, E.E. (1985). M.Sc.
Studies on *Sameodes albiguttalis* introduced for the biological control of water hyacinth. Life tables data analysis. Oviposition and feeding behavior as modified by other species that feed on water hyacinth. Evaluation of efficiency as biocontrol agent.

16. Mohamed G.E. (1985). M.Sc.
Ecological and biological studies on the sorghum stem borer *Sesamia cretica* Lederer. (Lepidoptera: Noctuidae).
Life tables data analysis. Effect of host plant, temperature, relative humidity and parasites on intrinsic rate of increase rm. Use of rm as an index to evaluate the role of the various biotic and abiotic factors on the life system of the species.

17. Mohamed, S.E. (1988). M.Sc.
Studies on the Pests and diseases of bees with special reference to *Galleria melonella* L. in Shambat area. Survey and identification of the biotic natural enemies (Predators, pathogens and pests) of honey bees. Life tables data analysis and use of rm as an index to evaluate, reproductive and population parameters of *G. melonella* as a pest of bees wax.

18. Mubarak, H.A. (1983) M.Sc.
Field evaluation of *Neochetina eichhorniae* Warner and *N. bruchi* Hustache in the biological control of water hyacinth.
Evaluation of the population growth of two species having nearly similar ecological requirements. Analysis of niche and coexistence of the two species. Evaluation of impact of each species acting alone and coexisting populations under field conditions.

19. Musa, K.G. (1985). M.Sc.
Studies on the sorghum shoot fly *Atherigona soccata* (Rondani) (Diptera: Muscidae).
Population dynamics as affected by, host plant, abiotic factors and cultural practices. Feeding behaviour, host finding and acceptance as affected by different hosts that possess various levels and types of resistance mechanisms.

20. Nasr, O.E. (1982). M.Sc.
Studies on some natural enemies of diaspin scales with special reference to *Parlatoria blanchardii* (Targ.).
Survey, collection and identification of natural enemies. Development of sampling techniques to determine the population density and distribution pattern of scale insects. Life tables data analysis and over view of the life system of P.

blanchardii. Evaluation of two major natural enemies of scale insects as biocontrol agents.

21. El Fahal, O.A. (1994) Ph.D.
Life system analysis of the date palm scale *Parlatoria blanchardii.* Development of a model and key factor analysis approach to obtain a simple predictive device for the population of *Parlatoria blanchardii*.

22. Yousif, E.I. (1994) M.Sc.
Studies on the biology, ecology, behaviour and host preference of the millet head worm in western Sudan.

23. Abd El Rahman, H. E. (2000) PhD.
The influence of food plants on the life system of the gregarious and solitary phase of the desert locust.

24. Muhigwa, J. B. B. (1999) Ph.D, (ICIPE, ARPPIS).
Responses of *Glossina fuscipes fuscipes* Newstead (Diptera: Glossinidae) to visual cues and host colors with particular reference to monitor lizard.

25. Hamed M. Hamed (1995) MSc.
Studies on *Amphibolus venator* (Klug.) (Hemiptera: Reduviidae) a natural enemy of insect pests of stored grains.

26. Eisa, E. A. A. (1999) M.Sc...
The Influence of Different Prey Species on the Mass culturing of the Common Green Lace Wing *Chrysoperla Carnea* (Chrysopidae: Neeuroptera).

27. Hag Musaad, E.A. (1999) M.Sc.
Integrated pest management of insect pests that cause cotton lint stickiness in the Blue Nile cotton schemes.

28. Mohamed, E.M. (1993) M.Sc.
Identification and Studies on Predatory Mites on *Parlatoria Blanchardii* in the Northern Region.
Survey, collection and identification of predacious mites associated with *Parlatoria blanchardii*. Study and analysis of life tables data and evaluation of efficiency of dominant species.

29. Ali, B. M. (1997) M.Sc.
Studies on the Biology, seasonal occurrence and control the Sahelian tree locust *Anacridum melanorhodon melanorhon* (Walker) (Orthoptera: Acrididae).

30. Ali, A., A, (1990) M.Sc.

Studies on *Asterolecanium phoenicis* Rao (Homoptera: Asterolecaniidae), A Date Palm Scale Insect in Golid Area**.**

31. Taha A. ElKhidir (2001) M.Sc.
Survey Procedures for Locating and Assessing Adult and Hopper Populations Density of Desert Locust.

32. ElHassan, M., A, A. (2003) M.Sc.
Efficacy of Blastospores of *Metarhizium* in Conjunction with the Adult Aggregation Pheromone in the Control of the Desert Locust *Schistocerca gergaria* (forskal) (Orthoptera: Acrididae).

33. Khane, A. S. (2002) M.Sc.
The Effect of Stage Specific Pheromones Alone and in Combination with the Insecticide Fipronil on Eggs, Hatchlings of the Desert Locust (*Schistocerca gregaria*, Forskal) (Orthoptera: Acrididae).

34. Suliman, E.M. (1999) M.Sc.
Studies on Some Grasshoppers Species, their natural Enemies and Control in the Area of Gadambaliya.
Survey, collection and identification of grasshoppers of economic importance. Study of population dynamics, assessment of damage. Control through conventional means such as baiting. Use of *Nosema* and Neem extracts as a new approach in the management of grasshoppers.

35. Nuri, A. A. (2001) M.Sc.
Population dynamics, seasonal movements and other peculiar behavior patterns of the tree locust *Anacridum melanorhodon melanorhon*.

36. Sidahmad, M. A. (2006) M.Sc.
Field Survey, Host Specificity and Life Cycle of the Mesquite Seed Feeding Bruchid *Algarobius prosopis* (Le Conte) (Bruchidae: Coleoptera).

37. Gebrel, A. A. (2004) M.Sc.
Studies on management and improvement of traditional beehives in Kadugli province.

38. Fageri, T. A. (2004) M.Sc.
Effect of the Nymphal Pheromones Blend (BPB) on the Gregarious Adults of *Schistocerca gregaria* (Forskal) (Acrididae: Orthoptera).

39. Dahab, A. A. (2007) M.Sc.
An assessment of biological and chemical Desert locust control agents on ground–dwelling arthropods in Red Sea Costal area, Sudan, using present absent sampling method.

40. Elbasher, M. I. (2008) M.Sc.
Effect of Desert Locust adult aggregation pheromone alone, and integrated with fractional doses of *Metarhizium anisopliae* var *acridum* on some non-target arthropods in the Red Sea coast.

41. Fadoul, A. A. (2004) M.Sc.
Studies on the effect of three species of *Heliotropium* on the life system of solitary Desret locust *Schistocerca gregaria* (Forskal) (Orthoptera: Acrididae).

42. Mohamad. (2005) M.Sc.
Mohamad Ibrahim Mohamed

43. Elhassan I. M. (2002) M.Sc.
Effect of *Metarhizium anisopliae* var. *acridum* (Metch) and the adult aggregation pheromone phenylacetonitrile (PAN) on the feeding rates of the Desert Locust, *Schistocerca gregaria* (Forskal).

44. Edward, L. K. Ak (2004) M.Sc.
Field Study of Host Plant Preference of Solitary Desert Locust *Schistocerca gregaria* (Forskal) (Orthoptera: Acrididae).

45. Seyam, A. M. (2012) M.Sc.
Use of environmentally friendly tactics in the fight against the Desert Locust in its natural habitat.

46. Abbaker, M. O. (2013) MSc.
Effect of NeemAzal®-T/S on Development and Nutritional Parameters of the Desert Locust, Schistocerca *gregaria (*Forskal*)*.

47.Ibrahim Guma Mohammed Adam (2013) MSc.
Improved sampling Technique for monitoring the Population ofdesert the Desert locust Locust Schistocerca gregaria (Forskal) population.

48.Omer Rahama Mohamed Rahama (2014) PhD.
Bio-ecology of the tree locust, Anacridium melanorhodon melanorhodon walker on the Acacia senegal tree in North Kordofan state.

49.Reham Yousif Osman Hassan (2014) MSc.
First record of soybean stem borer Melanagromyza sojae (Zehntner) (Diptera: Agromyzidae) on Alfalfa in the Sudan and investigations on its life system.

50.Elhadi Ahmed Mohamed Ali(2015) MSc.
Integrated Management of the Green pit scale Palmapsis phoenices (Roa.)on date palm in the Sudan.

51.Kholdi Fathi Salim Gomaa (2015) MSc.
Susceptibility of five pearl millet (Pennisetum glaucum Lin. Ecotypes with 3rd and 4th nymphal instars of Migratory locust Locusta migratoria migratorioides infestation.

IX. CONTRIBUTION TO THE DEVELOPMENT OF INSTITUTES:

1. Secretary of the Department Board, 1974-1976.
2. Students Tutor, 1976-1977.
3. Advisor, Students Agricultural Society, 1976-1977.
4. Faculty representative in the Technicians Board, 1977-1979.
5. Representative of the Dept. in the Faculty Board, 1982.
6. Acting Head Department, (Twice before 1982).
7. Head Department, 1982 to 1986.
8. Member of the Glasshouse Committee, 1975-1976.
9. Member of the Faculty Examinations Committee 1975-1976, 1981-1982.
10. Member of the Faculty Curriculum Committee, 1979-1980.
11. Member of the Faculty Research Board, 1982.
12. Member of the Faculty Board, 1982.
13. Representative of the Faculty in the University Graduate Faculty Board, 1983/1985.
14. Member of the University Senate, 1982/1985.
15. Acting Dean, Faculty of Agriculture (Twice in 1985).
16. Scientist in charge of the ICIPE field research station. Completed the establishment and supervise all activities of the station.

As the team leader of the Water Hyacinth Biological Control Project I was able to establish the following research facilities:

1. Quarantine and Biological Control Research Unit, at the Faculty of Agriculture. The Unit was built by NCR and equipped by the British ODA. It consists of two quarantine rooms, an anteroom and a laboratory. This unit now provides research facilities for graduate students working in the various fields of crop protection.

2. Two field stations at Malakal and Bor built by the Sudanese National Council for Research (NCR) for the mass culturing of natural enemies.

As coordinator of the biological control of scale insects I established one major field release station at Karima in the Northern Province together with two other sub stations in the Nile Province.

As Head Department I have worked in collaboration with my colleagues at the Faculty to promote the agricultural link between the University of Khartoum and the Queen's University of Belfast during the period 1982-1986. As a member of the Department I contributed to arabization of the curricula (scientific terms used in insect ecology and biological control) and the development of the course unit system (outlines of insect ecology, integrated pest management and biological control).

I have presented to the faculty a proposal for the establishment of a biological center in 1991 and recently the proposal was discussed and adopted by the Faculty Board. Also in the same period and in collaboration with the director of the photography unit a proposal for the establishment of an audio visual unit was presented.

I have also cooperated with the examination committee to develop a computer aided system for easy processing and presentation of examination results. I am also continuously cooperating and helping my colleagues and graduate students from the various departments in computer word and data processing.

As Scientist in charge of the ICIPE field station, I Completed the established of the field station at the Red Sea Coast (RSC). The station consists of a guest hose facility, laboratory, and insectary for solitary and gregarious locusts, a one hectare farm and meteorological station.

XI. RELEVANT EXTRA CURRICULA ACTIVITY:

1. Team leader of the Sudanese, British Water Hyacinth Biological Control Project during the period 1978-1981. This project was sponsored by the University of Khartoum, NCR, the Federal Ministry of Agriculture and Forestry, and the British ODA. I am still leading this project which is now sponsored by the above mentioned Sudanese institutions after the participation of the ODA.

2. Member of the Striga research project which is sponsored by the University of Khartoum, the Agricultural Research Corporation and CIDA.

3. Team leader and coordinator of the date palm scale insects biological control project, Ministry Agriculture Animal Wealth and Natural Resources 1988.

4. Member of the pest and diseases committee of the Ministry of Agriculture Animal Wealth and Natural Resources, 1975.

5. Member of the pesticides committee , Ministry Agriculture Animal Wealth and

Natural Resources 1978.

6. Member of the Steering Committee of the Sudanese - German Services for Vegetable and Fruit Farmers, Ministry of Agriculture, Animal Wealth and Natural Resources since 1988.

7. Member of the Technical Committee of the Sudanese -German Services for Vegetable and Fruit Farmers , Ministry of Agriculture, Animal Wealth and Natural Resources since 1989.

8. Member of the Desert Locust Steering Committee, Ministry of Agriculture, Animal Wealth and Natural Resources since 1990.

9. Member of the National Council of Integrated Services For Farmers, Ministry of Agriculture, Animal Wealth and Natural Resources since 1990.

10. Member of the National Council of Biological Control since 1991.

11. Member of the Ministerial Committee for the eradication of the green scale insect in the Northern State, Ministry of Agriculture, Animal Wealth and Natural Resources since 1992.

12. Member of the ministerial committee for the follow-up and evaluation of activities of the national pesticides laboratory, Ministry of Agriculture, Animal Wealth and Natural Resources, 1993.

13. Consultant to UNDP in integrated pest management in ADS in Sudan 1n 1989.

14. Consultant to ICIPE, Kenya, in the ecology of the desert locust in the Red Sea area of the Sudan in 1990.

15. Consultant to the German GTZ, biological control of water hyacinth project and biological control of *Striga* at IITA, Benin in 1992.

XI. PARTICIPATION IN SYMPOSIA AND CONFERENCES:

I have participated in the following symposia, conferences, meetings, studies and committees organized and sponsored by Sudanese and international organizations.

1. The 2nd. joint meeting of the Entomological Societies of America. Canada and Quebec, Montreal, 1972.

2. Workshop on Aquatic Weeds in the Sudan - Sudanese NCR and American NAS, Khartoum, 1975.

3. The 19th. Annual Conference of the Philosophical Society of the Sudan - Water Quality and Risks of Pollution - Philosophical Society of the Sudan and NCR, Khartoum, 1976.

4. Committee on the evaluation of the Sudanese, German Water Hyacinth Control Project - Ministry of Agriculture and Irrigation and the German GTZ, Khartoum, 1977.

5. Committee on Research and Training in Water Hyacinth Control - Ministry of Agriculture and Irrigation and the German GTZ, Khartoum, 1977.

6. Symposium on Weed Research in the Sudan - University of Gezira. The Agricultural Research Corporation and The University of Hohenheim, 1978.

7. Symposium on Crop pest Management - Ministry of Agriculture and Irrigation and Faculty of Agriculture, Khartoum, 1978.

8. The 1st. Annual Conference on Research for Agricultural Development - University of Juba and Southern Region Ministry of Agriculture and Natural Resources, Juba, 1981.

9. The 3rd. Annual Meeting and Conference of the African Association of Insect Scientists, Khartoum, 1981.

10. Programme, Building of the Modern Science - Based State, NCR, Khartoum 1981.

11. The 2nd. Annual Conference on Research for Agricultural Development - University of Juba and the Southern Region Ministry of Agriculture and Natural Resources, Regional Ministry of Agriculture and Natural Resources, Juba, 1982._

12. Natural Grain Storage Seminar - NCR and FAO. Khartoum, 1982.

13. Meeting to discuss Problems of Potato Production in the Sudan, Agricultural Bank, Khartoum, 1982.

14. Development of the Master Plan for the Sudanese - German Services for Vegetable and Fruit Farmers 1986.

15. Symposium on Oasis Agricultural Systems. Tunisian Ministry of Agriculture and the French INRA, Tozeur, Tunisia, Nov. 1988.

16. International Study Workshop on Newer Methods in the Isolation, Characterization and Evaluation of Biopesticides. USA NRC, BOSTID and ICIPE, Nairobi, Kenya, April 1990.

17. Workshop on the Implementation of the International Code of Conduct on the Distribution and Use of Pesticides, Khartoum, Sudan 15-19 September 1991.

18. Workshop on the control of the African Migratory locust on Gum Arabic acacia, PPD and Gum Arabic Comp. Khartoum, 15-19 May 1992.

19. Objectives-oriented Project Planning (ZOPP) workshop for the discussion of the plan of operation of the Sudanese German integrated services, Phase III, Khartoum, Sudan January 1992.

20. Symposium on the integrated biological control of the desert locust, University of Juba and the Association of the Arab Research Council, Khartoum, 3-8 October, 1995.

21. Annual Conference of the Entomological Society of America, Las Vegas, 17-22 December 1995.

XII. DELIVERED LECTURES AND SEMINARS:

I was invited to deliver lectures within my specialization by various local and international institutions and organizations. These were as follows:-

1. Biological control of water hyacinth in the Sudan. Delivered at the Queens University of Belfast, Depart Agriculture, Agricultural Zoology Research Division, February 1985.

2. The problem of crop pests in the Sudan. Delivered at the Queens University of Belfast, Department of Agriculture, Agricultural Zoology Research Division, February 1985.

3. Evaluation of the biological control project on water hyacinth. Ministry of Agriculture animal Wealth and Natural Resources, Plant protection Department, Khartoum North, February 1986.

4. Management of water hyacinth, a classical case of biological control from the Susan. delivered at the University of California, Berkeley, April 1987._

5. Biological control, prospects against locusts and grasshoppers. Arab Organization for Agricultural Development, Khartoum, Sudan, August 1989. AOAD.

6. Biological control, ecological basis and implementation with special reference to locusts and grasshoppers. ICIPE, Nairobi, Kenya, July 1990.

7. Biological control in the Sudan. IITA, Cotonu, Benin, May 1991.

8. Natural enemies of Striga and prospects of its biological control. IITA, Cotonu, Benin, May 1991.

9. Biological control of water hyacinth, a successful attempt in the Sudan. NCR, Khartoum, Sudan April 1992.

XIII. COMPUTER PROFICIENCY AND PROGRAMMING:

I have mastered the use of a good number of old and quite modern computer software. These include the following:
Word processors E.g. Volks Writer, Word perfect, Microsoft Word and Professional Word Star. Spread sheets E.g. Lotus 123 and Quattro. Data bases E.g. Reflex, Rbase and Professional File. Statistical packages E.g. Microstat, Epistat and Systat. Graphic software E.g. Harvard Graphics and Boeing 3D Graphics. And a number of operating systems and utility packages including Windows 95 and associated software.

I have also used and trained a good number of my graduate students in the use of packages especially written for ecologically oriented entomological research. These include the soft ware "Insect Demographic Analysis"(IDA) developed for detailed analysis of life tables data systems and the program "Jolly" developed for the absolute population estimates of insects through capture-recapture techniques.

I have also developed two basic programs to compile and analyzed ecological and behavioral data for a wide range of insect species. The first one named "Behavior.bas" modified to study the process of host finding and acceptance of parasitic insects and to evaluate the parasites various activities during this process. The other program named "Daydegre.bas" is developed as a weather data management tool and to compute the physiological time or day degree of insects.

Beside these, automation of life tables data spread sheets was developed through macros and this made life tables analysis easy to compute.

All these packages are availed to my students who use them in the analysis of their data.

XIV. AWARDS AND SCHOLARSHIPS:

1. Fulbright scholar, at the University of California, Berkeley during the academic year 1987/1988.
2. Arab Organization for Agriculture award for outstanding research leading to agriculture development, Cairo, 2007.

XV. MEMBERSHIP OF SCIENTIFIC ORGANIZATIONS:

I am a member of the following scientific organizations:

1. Entomological Society of America (during 1971 - 1974).
2. The Sudan Agricultural Society.
3. The Philosophical Society of Sudan.
4. The Sudanese Environment Protection Society.
5. The Arab Society for Plant Protection.
6. The African Association of Insect Scientists.
7. The association of orthopteran scientist.
8. Sudanese Wildlife Society