Posters Abstracts

Entomology Posters

Ps 1: Studies on the economic threshold level of jassid, *Jacobiasca lybica*, De Berg., (Homoptera: Cicadellidae)on cotton

Omer A. Elnour. Hassan O. Kannan and Abbas E. M.Elamin
ARC, Gezira Research Station
Crop Protection Research Centre
Entomology Section

The study was carried out at Gezira Research Station Farm under natural field infestation and cage conditions during 2001/2005 seasons. The objective of this investigation was to determine the economic threshold levels (ETL) of cotton jassid, *Jacobiasca lybica*, (Homoptera:Cicadellidae) at different levels of infestations and various stages of crop growth. The approach was conducted on Barac (67) B and Barakat 90 cotton varieties in the field whereas only Barac (67)B was evaluated under cage conditions. The results obtained acknowledged the susceptibility of both genotypes to jassid infestation with Barac (67)B being the most vulnerable to the pest incidence. Moreover, the study revealed that the optimum ETL were 30 and 50 nymphs and or adults/100 leaves for Barac (67)B (Acala) and Barakat 90 (Long stable), respectively.

Keywords: Jassid, Field infestation, ETL, Genotype

Ps 2: Susceptibility of the red flour beetle,*Tribolium castanum*(Herbst), to Phosphine: Can Phosphine ever stand as a magical fumigant?

Esam E. B. M. Kabbashi; Shereen M. Awad and Mohamed E. Shazali

Phosphine is a universal fumigant of store insect pests being used for more than 70 years worldwide. In Sudan it is the most known fumigant that is used for this purpose for the farmersin particular. The use of this fumigant is generalized for the public sector in replacement of the methyl bromide which will phase out in 2015. An experiment into the susceptibilityof the red flour beetle (*Tribolium castaneum Herbst*) for this fumigant was done in the Food Research Centre (FRC), Khartoum during. The damaging stages of this insect were tested (larva

and adult). The results reflected that one tablet of QuicRkphos® (1 gram of phosphine PH_3 for a period of five days) was unable to perfect the flour from the beetles in two of the flour tests done with corrected mortalities (90.80, 100, 100 and 98.90%. respectively). However, this dose succeeded in disinfesting the test flour from larvae and adults (100% corrected mortality) when used for a period of (6) and (7) days and 5 a period of 5 days for the larval stage. Another experiment was conducted using 2 tablets Quickphos® for 5, 4, 3, 2 and 1 day.

Keywords: Fumigant, Phosphine, Quickphos®, Sudan, Susceptibility,*T. castaneum*

Ps 3: Survey for fruit fly Species (Diptera: Tephritidae) in Sennar State

Mahadi M. Zein and Hassan O.Kannan

Agricultural Research Corporation, Sennar. Sudan

Fruit flies (*Diptera: Tephritidae*) are the most serious insect pests of fruits and vegetables in tropical and sub-topical areas of the world. They destroy horticulturalproduce by breeding in fresh plant tissues while still on the plants and causing serious economic losses. A survey was carried out in Sennar State namely at Sennar. Morafa, Sennar and Singa to identify fruit flies species both the indigenous and exotic ones in the area, to determine their relative abundance, and performance of the attractant Nulure as a method for their mass trapping. The survey revealed the presence of six fruit fly species, mainly; mango fruit fly, *Ceratitis cosyra*, *Bactrocerainvadens*, *Bactrocera cucurbitae*, and *Dacus lonistylus*. Guava fruit fly,*Ceratitis capitata,C. quniriaC. cosyra* were the dominant species in the area. Nulure food habit attractant provide effective mean for catching females of different fruit fly species whereas, its efficiency was affected by time and temperature.

Keywords: Fruit flies, Insect pests, Nulure attractant

Ps 4: The effects of feeding by pollen substitutes on Sudanese honeybee activities

Faiza H. M.A Akasha
University of Bahri
College of Agriculture
Department of Crop Protection

The effects of four pollen substitute diets for feeding honeybee colonies were investigated using different activities brood rearing, population growth, pollen collection, and honey yield, as criteria for assessment. The study was in Khartoum State, Kadrow locality during July/2005 – Agu./2006. Each colony started with 5 combs full of bees. They were divided into five groups using different types of pollen substitutes compared with the control. The group arrangements were as:1Soya bean flower, brewer's yeast and honey (Diet A),group 2/ Dates plam, sugar and water (Diet C), group 4/Brewer's yeast, sugar and water (Diet D), group 5/ without feeding – control (Diet E). The study showed that all honeybee colonies consumed the different diets in varying rates. The highest diet consumption was during summer months and the beginning of autumn while the lowest diets consumption was during nectar flow period winter months. Diet (A) overruled the other tested diets in all the colony activities, rated according to their value in promoting honeybee colony activities as diet (A), (C), (B), and (E) respectively.

Keywords: Pollen,Honeybee, Colony, Diet, Substitute

Ps 5: Fruit fly species(Diptera:Tephritidae) on some fruit trees and vegetables in the Gezira State,Sudan

Rania M. Elaraky, Faiza E. E. Salah and M. H. Z. Elabedeen
Agricultural Research Corporation, Wad Medani, P.O. Box 126, Sudan

This study was conducted in the Gezira State during 2008/2009. The objectives of the study were to identify fruit fly species that attack fruit trees (Mango,Guava, Banana) and vegetables (eggplant, cucurbits). The infested fruits were collected and brought for rearing in the Integrated Pest Management Laboratory, of the Gezira Research Station, Sudan. They were identified at the

(Insect Taxonomy Unit), Agricultural Research Corporation, Wad Medani, Sudan. The results showed that the fruits were infested by *Bactrocera invadens*, *Ceratitis cosyra*, and *Drosophila melanogaster.* The cucurbits were infested by *Dacus vertebratus* and the Eggplant by *melanogaster*. The study revealed that Guava fruit was highly infested by*B*. *invadens* and C. *cosyra*. Infestation by *B. invadens*, ranged between 78-100% and by *C. cosyra* ranged between 0-22% as compared to mango and banana fruits. The mango infestation on banana was found to be 80% and 19% by B. *invadens* and *D. melanogaster,* respectively. The infestation on cucurbits and eggplant was found to be 100%. The result showed that *B.invadens* is the dominant species on the fruit trees.

Keywords: Fruit fly, Fruit trees, Vegetables, Sudan

Ps 6: Geographical distribution and abundance of the sorghum midge, *Stenodiplosissorghicola* Cop., (Diptera: *Cecidomyiidae)* in rainfed area, Sudan

Anas A. Fadlelmula[1] and Ahmed E. M.Hassan [2]
[1]Damazin Research Station, (ARC),[2]Gezira University, Crop Protection Department

Surveys for the sorghum midge, (*Stenodiplosissorghicola* Cop.) distribution were conducted at Gedarif, Blue Nile and Sinnar rainfed areas during seasons 2004/05 and 2005/06. Sorghum midge occurrence was observed in all surveyed areas, and mapped by using the coordinates and the software programme. Its seasonal abundance was also studied during the period June – December of seasons 2004/05 and 2005/06 at Damazin Research Station Farm. The sorghum midge showed low population level from June to August, and increased from September onwards and peaked in late October and early November then declined towards the day hours was peaked between 9:00 am -11:00 am. (37.0 – 49.3 adults).The cause of such situation was attributed to high relative humidity (69 -80%) and moderate temperature (22 -29^{0}C).

Incidence of sorghum midge parasitoids and predators were also observed during October and December 2004 and 2005. Parasitoids showed low population level during October and December and peaked in mid November. The Orius bug and spiders are the most abundant predators among the predators recorded.

Keywords: Sorghum midge, Rainfed, Peak,Parasitoid

Ps 7:Action of the Sudanese, the Chinese and the Egyptian garlic oils against *Callosobruchus. maculatus* (Coleoptera: Bruchidae)

Hayat M. A. Hamid[1] and Azhari O. Abdelbagi[2]

[1]plant Protection Directorate, Khartoum North, Sudan.
[2] University of Kassala, Sudan.

Laboratory experiments were conducted in the Department of Crop Protection, Faculty of Agriculture, University of Khartoum, Shambat, to evaluate the efficacy of three types of garlic oils: the Sudanese (local), Chinese and Egyptian on the cowpea beetle, *Callosobruchus maculatus*. Volatile oils from the Sudanese and Chinese garlic were obtained by steam distillation and soxhlet extraction using ethanol correspondingly, whereas Egyptian (ready-made) garlic oil was bought from a perfumery at Omdurman market. The oils were tested at concentrations of 0.01%, 0.1%,1%, 5% and 10%, at exposure periods ranging from 24 to 72 hrs.

The results showed that, the volatile oils of the three garlic tested caused significant mortality to the test insect. The results indicated that both sexes are sensitive to oil fumigation with males generally more sensitive than females. The effects were time and dose dependant.

The respective 48hrs median lethal doses (LD_{50}) for male and female were; 27 and 2727ppm for the Sudanese oil 9 and 2512ppm for the Chinese oil and 97 and 417ppm for Egyptian garlic oils.

The median lethal times (LT50) at the10% concentration for male and female were 7.29 and 13.43 hrs for the Sudanese oil, 8.4 and 8.8 hrs for the Chinese oil and 11.04 and 11.72 hrs for the Egyptian garlic oil correspondingly.

Keywords: Garlic oil, Volatile, Cowpea beetle, Lethal dose

Ps 8: Efficacy of two seed dressing insecticides and Neem seed extracts against aphids, *Aphis craccivora (*Homoptera:Aphididae)in faba bean in Northern Sudan

Mahadi A. Ahmed[1] and Francis L. Oji[2]
[1]Dongola Research Station(ARC), P.O Box 35, Dongola, Sudan
(New address Shambat Research Station)
[2]Hudeiba Research Station(ARC) P.O. Box 31, Ed-Damer, Sudan

This studywas conducted carried out during 2002/03, 2003/04 and 2004/05 seasons in the Northern and River Nile States to evaluate the effectiveness of two seed dressing insecticides, Gaucho70 WS (imidacloprid) and Cruiser 350 FS (thiamethoxam) at the dosage rates of (1.8, 2.4 and 3g/kg seed) and (1.8, 2.4 and 2m1/kg seeds) respectively, and Neemseed extracts (3, 5, 5 and 6 kg powder/feddan) for the control of (A. craccivora) in faba bean varieties (Hudeiba 72) and (SM-L) were sown in River Nile and Northern States, respectively, under improved cultural practices. Results showed that, Gaucho at 3g/kg seeds, Cruiser at 3ml/kg seeds and Neem at 5kg powder/feddan was very effective in controlling aphids in faba bean. The practical budget analysis indicated that the tested compounds with their effective doses increased net profits.

Keywords: North Sudan, Faba bean, Aphids, Seed dressing, Imidacloprid, Thiamethoxam, Neem

Ps 9: Evaluation of Pyrifos-Elnasr (chlorpyriphos) 48% EC against cotton aphid, *Aphis gossypii* Glover (Homoptera: Aphididae) on potato crop

Mahadi A. Ahmed

Dongola Research Station, Agricultural Research Corporation (ARC), P.O. Box 35, Donogla, Sudan

A small scale experiment was carried out during winter season (2009/10) at Elmasakin Island east of Donogla, to evaluate the efficacy of pyrifos-Elnasr (chlorpyriphos) 48% EC (0.2 L/feddan) against cotton aphid (*Aphis gossypii* Glover) on potato (*Solanum tuberosum L.*). Pychlorex (chlorpyriphos) 48EC (0.2 L/feddan) and Agroshal (carobsulfan) 25%EC (0.4 L. /feddan) were used as

counterpart and standard, respectively. Pyrifos-Elnasr effectively controlled aphid and significantly increased yield of potato compared to the untreated control and its performance was comparable to Pychlorex and Agrooshal treatment.

Keyword: Chlorpyriphos, Cotton aphid, Potato, Counterpart, Carobsulfan

Ps 10: Efficacy of Imidoc 70 WS, a new formulation of imidacloprid seed dressing insecticide against aphids, *Aphis craccivora*,(Homoptera: Aphididae) in faba bean in Northern Sudan

Mahadi A. Ahmed

This study was conducted at the Northern State to evaluate the effectiveness of the seed dressing insecticide, Imidoc 70WS (imidacloprid), compared to Gaucho (counterpart) for the control of aphids,*Aphis craccivora*, in faba bean. Results showed that, Imidoc at 3g/kg seeds was very effective in controlling aphids in faba bean. The product gave yield comparable to the counterpart and a significantly increment of as much as 36.4% compared to the untreated control.

Keyword: Effectiveness, Dressing, Gaucho, Aphids, Faba bean

Ps 11:Efficacy of some insecticides against cotton aphid, *Aphis gossypii* Glover, (Homoptera: Aphididae) on potato crop

Mahdi A. Ahmed
Dongola Research Station, Agricultural Research Corporation
P.O. Box 35, Dongola, Sudan

A small scale experiment was carried out during winter season (2006/09) at Elmasakin Island east of Dongola, to evaluate the efficacy of three insecticides: Brigh 25% EC (Carobsulfan), Agroshal 25% EC at 0.4/l (carobsulfan_ and pyrifos-Enasr 48% EC at 0.2 l/feddan (chlopyriphos) against cotton aphid (*Aphis gossypii* Glover) on potato (*Solanum tuberosum* L.). Marchal (carobsulfan) 25% EC was used both as standard and counterpart. Each of the three insecticides effectively controlled aphid compared to the untreated control and their performance was comparable to the standard treatment to

Marchal at 0.4 L./feddan and significantly increased yield of potato compared to the untreated control.

Keyword: Elmasakin, Island, Carbosulfan, Cotton aphids, Potato

Ps 12: The occurrence of some insect pests and diseases on sunflower (*Helianthus annuus L.*) in Gezira, Sudan

Mai A. Ali1, Dalia S. Eshag[1] and Abdelelah Badawie[2]

1-Plant Pathology Centre, Gezira University, P.O. Box 20, Wad Medani, Sudan
2-The rainfed crops Research Centre for Arid and Semi Arid Areas, Gezira University

The study conducted at Gezira University Farm during both winter and autumn for three successive seasons 2011, 2012, 2013, revealed the presence of different types of symptoms that vary between mottling; general chlorosis; systemic ring spot followed by total wilting and drying. Forty eight percent of the total amount tested serologically revealed the presence of tobacco streak virus and tomato (TSWV) ring spot viruses either single or in mixture, however, still there is number of samples that showed the presence of unknown potty and luteoviruses. The seed testing confirmed clearance of all the tested lines from the different seed-borne viruses, but still there were some incidences of seed transmitted ones like the (TSWV) but at a very low level (2%).Three varieties of the nine cultivated, were selected as having some sort of resistance/tolerance to the different detected viruses. Whitefly is prevalent throughout the growing seasons, aphids specially *Myzus persicae*. also occurred, and to a lesser extent leaf hoppers, jassids, and the leaf minors. Apart from the viral diseases Alternaria spot (*Alternaria helianthi*) and powdery mildew (*Erysiphe cichoracearumf*. Sp. *Helianthi*) were fungal diseases attacked the crop at different stages. Powdery mildew has a noticeable effect in reducing the head size especially when occurred early in the season. An outbreak of the sorghum chaffer, (*Bachnoda interrupta*) was observed on autumn season, 2013 before harvesting and resulted in more than 60% head damage.

keywords:Mottling Chlorosis, Insects Diseases

Ps 13: Seasonal abundance and characterization of larval habitats for mosquito *fauna(Culicidae)* prevalent in the Gezira irrigated area of central Sudan

Mostafa M. Ibrahim1and Yousif E. Himeidan2

[1]Department of Medical Entomology and vector control, Blue Nile National Institute for communicable Diseases, Gezira University, Wad Medani, Sudan
[2]Vector Health International, Africa Technical Research Centre, Arusha, Tanzania

The present study was carried out to understand the distribution of larval habitats, occurrence of immature stages of different mosquito species and their associations with habitats characters and environmental factors in Gezira area of central Sudan during 2010.

Weakly cross-sectional larval surveys were carried out during condition of two months; cool dry (November – February), hot dry (March – June) and rainy (July – October) seasons of 2010 in Barakat and El-kareiba (urban and rural, respectively) sites in Wad Medani area. Standard dipping using enamel bowls (WHO, 1970) was employed for sampling larvae possible breeding sites and habitat characterizations were observed. All larval specimen were identified morphologically.

About 322 larval habitats were surveyed, out of which = 51.6% (166) were found positive for mosquitoes breeding (56.78%, 29.6%, 13.55%) for *Anopheles*, *Culex* and *Aedes* respectively), A total of 5525 collected larvae were identified as follows; as *Culex* (2617 = 47.37%), Anopheles (2600 = 47.06%) and Aedes (308 = 5.57%). A high proportion was reported during the hot dry seasons in both sites; Barakat (x^2 = 10.641, p = 0.009) and El-kareiba (x^2 = 23.765, p = 0.0001). The main breeding sites for Anopheles larvae were leakages from broken drinking water pipes (51.55%), irrigation canals (34.2%), hoof prints (6.4%), tries tracks (5.5%) and water tanks (2.43%). It is quite evident from the results that C. *Arabiensis* predominate other members of the family *Culicidae* (42% and 39.47% respectively). However, *Aedes aegypti* was the only Abden mosquito sporadically found in the area.

For control of the mosquito it is recommended, to maintain broken drinking water pipes and adopt intermittent irrigation cycles.

Keywords: Larvae, Mosquito, Characterization, Habitats

Ps 14: Studies on *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae), as factitious host for *Trichogramma* mass rearing

Tag Elsir E. Abdalla

Agricultural Research Corporation (ARC), Crop Protection Research Centre, Entomology Research Section, Wad Medani, P.O. Box 126, Sudan

The study was conducted at the EntomologyResearch Program, Crop Protection Research Centre, Agricultural Research Corporation, during January 2009 - February 2010 at laboratory conditions of 28.3 $\pm^0$C, 20-60% relative humidity, 100 – 400 IX high brightness and 12/I2h L/D photoperiod. The study investigated the morphology, biology and some ecological aspects of *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae), relevant to its use as a factitious host for *Trichogramma* mass rearing in the future. The study clarified the morphology, metamorphosis, pre-oviposition, ovipoistion and post ovipoistion periods. *C. cephalonica* has seven larval instars, each lasted 4-7 days; the male/female sex ratio was 1:1.12; eggs pupation accomplished within 10 days; fecundity averaged 27.4 eggs/female; 90.8% of the laid eggs were healthy; the female has no pre-oviposition period; the oviposition period ranged 3-7 days and the post-oviposition lasted 4-7 days. The days taken to emergence of the first adult averaged 43; the days taken to full emegerance were 74; the bulk emergence period ranged between the 46th and 62nd day of eggs laying and the recovered moths out of initially sprinkled eggs was 87.5%. Adults do not feed during their adulthood. The study also clarified the effect of relative humidity at the levels of 20-30%,>30-40%, >40-45%, >45-50%, >50-60% on fecundity, weight of one egg and number of eggs in one gram. The lowest weight of an egg (40.64X10^{4}mg) was record at the lowest relative humidity (>50-60%. The highest number of eggs in one gram (24241was) was recorded at highest relative humidity (>50-60%).

Keywords: *Corcyra cephalonica*, *Trichogramma*, Factitious host, Biology and Ecology

Ps 15: Application of the insecticide. Confidor 200 S Lagainst green scale, *Palmaspis phoeninicis*' Hoein., on date palm

Salah E. Elamin[1], Gamal A. Mohamed[2]
1-Faculty of Agriculture, University of Khartoum
2-Plant Potection Directorate, Ministry of Agriculture

Real outbreak of the date palm green scale insect started, in Northern Sudan, when it crossed the barrier of Albaga sand and appeared in Elghaba scheme, in 1998. The scheme represents the largest area of date palm cultivation in the Northern State. Accordingly, drastic control measures, like the decision to remove the infested trees were dismissed. Improvement of cultural practices and the search for cost effective pest control methods were resorted to (Ahmed Al-Saffar, 1997). The IPM approach was adopted, lately, including intensive programmes of crop hygiene and husbandry to uplift the date palm tree from biological exhaustion. Within this context, Confidor 200SL was introduced as a soft chemical alternative.

Large scale field application of confidor, in the period, 1st of April to the 5th of May, 2004, in Elghaba area, proved effective with an estimate of 97% insect control success. The gross return from an average yield per tree surpassed the cost of application of confidor fro control of the green scale insect on the date palm tree; with a benefit margin of on and a half times the average cost or more.

Keywords: Green pit scale, Albaga, Elghaba, Date palm, Confidor

Ps 16: The Biology of *Caryedon serratus* Olivier (Coleoptera: Bruchidae) on seeds of some Acacia trees in Damazin Area, Blue Nile State, Sudan

[1]Abbas A. El Sheikh and Ali E. Ali[2]
1-Sennar Research Station
2-Gezira Research Station

The aim of this study was to collect knowledge and information on the biology of the seeds insect pest *Caryedon serratus* Olivier (Col. Bruchidae) on some gum producing acacia trees evaluated; *Accacia sengal* (Hashab). *A. polycanth* (kakamooi). *A. seyal* (Talih) and *A. seyal* var. *fistula* (Saffar). The seeds were collected from Khor Donya forest (5 km, western Damazin). The experiment was conducted in the laboratory of Damazin Agricultural Research Station. The biology was studied on 20 replicated (in petri-dishes) seeds of each of the four

acacia trees during summer and autumn 2008 and 2009, respectively. Temperature and relative humidity recorded. Egg incubation, larval, pupal, adult longevity, pre-oviposition, oviposition, pos-oviposition, and the generation periods together with female fecundity were determined. The results indicated all developmental stages significantly increased during autumn and decreased during summer. Female fecundity significantly increased during summer and decreased during autumn.

Keywords: Acacia, Gum, Khor Donya

Ps 17: Changes on physical, chemical and nutritional value of infested date palm fruits (barakawi) c.v with date palm dust mite, *Oligonychus afrasiaticus* Meg.

Islam K. Saeed[1] and Dafalla E. Yousof[2]
1-Department of post-harvest Physiology and storage, Food Research Centre, Shambat-khartoum – sudan.
2-Dongola Agricultural Research Corporation, Northern State, Sudan

This study was carried out in Dongola area to evaluate changes in date fruit as a result to infestation with date palm dust mite. Some infested date fruits Barakawi cultivar in Tamar stage were collected from infested bunches of 4 date palm trees selected randomly in anorchard in Dongola area. The sound fruits also selected randomly from a tree mite infestation trees and were sent to Food Research Centre at Shambat to determine the change in physical properties, chemical composition and nutritional value. The results indicated that sound Barakawi date fruit appeared to have significantly higher value of physical characteristics in fruit length, width, weight, pulp weight, seed weight, flesh thickness, pit percentage. Also, the results indicated that differences between the infested fruits and sound one in moisture, content, total sugar, reducing sugar, sucrose, carbohydrates and the sound fruits recorded higher contents than infested one. The proteins and fibers content were recorded insignificantly and two contents were found higher in infested fruits. The minerals content potassium, phosphorous, Magnesium and Calcium recorded higher in sound fruits compared to infested one.

Keywords: Date palm, Infestation, Dust mite, Protein, Fibers

Ps 18: Use of some natural and chemical products for control of *Caryedon serratus* Olivier (Coleoptera Bruchidae) on seeds of *Acacia Senegal* (Hashab) trees in Damazin Area, Blue Nile State, Sudan

[1]Abbas A. E. Sheikh and Ali E. Ali[2]
[1]Damazin Research Station and [2]Gezira Research Station

This study was carried out to evaluate the effects of some natural and chemical products on control and protection of stored *Acacia senegal* (Hashab) seeds from infestation and damage by bruchids insect pests. The seeds were lately collected in March (after three months of seeds ripening) from Khor Donya forest (5 km western Damazin). Seed samples, each of 250 gram replications were mixed with each product and stored under room temperature for six months. The natural products were neem seeds kernel powder (NLP) at rates of 2.5% and 5% (W/W), neem leaf powder (NIP) at rate of 2.5% (W/W), whole fruit of red hot pepper (PIIP) at doses of 15% and 25% (W/W). The chemical product was Propoxur 1% WP at doses of 0.3% and 0.5% (W/W). These products were studied for control of *C. serratus* on *A. Senegal* seeds in the store compared to untreated control and treated control Malathion 57% EC at dose of 2%. The results indicated that NSKP atthe dose of 5% (W/W), RHP at doses 15% and 25% (W/W), WWA at 25% (W/W) and Propoxur 1% WP at 0.3% and 0.5% (W/W) had significantly affected all the developmental stages of the bruchid and hence protected the seedsfor six months from infestation and damage compared to the untreated control. These products and doses had no adverse effects on the seeds germination. However, WWA at the rate 25% (W/W) and Malathion 57% EC at 2%, adversely reduced the seeds germination.

Keywords: National products, Control, Infestation, Damage

Ps 19: Survey. damage assessment and control of insect pests on seeds of some Acacia trees in Damazin Area, Blue Nile State , Sudan

[1]Abbas A. E. Sheikh and [2]Ali E.i Ali
[1]Damazin Research Station and [2] Gezira Research Station

This study was carried out to quantify infestation and damage of seeds by insect pests on some gum producing acacia trees. These trees are *Acacia se*negal (Hashab), *A. Polycanth* (Kakamoot), *A.seyal* var. *seya*l (Talih) and *A. seyal* var. *fistula* (Saffar). Two surveys were conducted in Khor Donya forest (5 km. western Damazin) and Elnour forest(13.5 km. eastern Damazin . During season

2006/2007 in early December (just after seeds ripening) and late in March (after seeds ripening) and late in March (after three months of seeds ripening) in the locations. A general survey of insect complex in the two forests was done using light traps during December, March, June and September in season 2006/2007. Insect' infestation and damage were evaluated in pods and seeds of the four acacia species. Seed insect species were randomly collected (25-50 adults) from the seeds of each of the four acacia species and identified by the Insect Taxonomy Unit of the Agricultural Research Corporation at Wad Medani. The results obtained from the light traps indicated that the bruchid insects were very few compared to other insects in both two forests. The survey showed that only two bruchid species *Bruchidae uberanusTabricius* (Col.: Buruchidae) and *C. serratus* Olivier (Col.: Bruchidae) were found attacking acacia seeds of *A. seyal*. The study recommended early harvesting of Acacia seeds as a primary protection for seeds against the bruchid species.

Keywords: Infestation, Damage, Acacia, Survey, Light trap

Ps 20: Efficacy of Hargel ,*Solanostemma argel* (Del) hayne, shoot extract for the control of the cowpea beetle, Callosobruchus maculatus, (Coleoptera:Bruchidae)

Mohammed O. S. El Khatim[1], Azhari O. Abdelbagi[2]

1-Department of Plant Protection Faculty of Agriculture Omdurman Islamic University

2- Kassala Unversity, Sudan

Laboratory studies were conducted to evaluate the efficacy of aqueous and organic extracts of the Hargel shoots against the adult stage of the cowpea beetle, *Callosobruchus maculatus* in the Sudan. Hargel shoots were extracted sequentially by organic solvents of increasing polarity (Petroleum ether, Ethyl acetate and Ethanol) as well as directly by distilled water or ethanol. Extracts were tested at concentrations ranging between 1% to 10%. The evaluated efficacy parameters included; mortality, repellency, antifeedant and effect on weight loss in stored cowpea (*Vigna unguiculata*). The tests were conducted in Petri dishes (9 cm i.d) and plastic cups (capacity 200 ml) and the obtained data were subjected to the analysis of variance (ANOVA) and further by probit analysis.

The result of the mortality data indicated that the direct extraction with ethanol was the most potent against the test insect as shown by its low LD_{50} of 0.39%.

Various types of Hargel shoot extracts inducted significant dose dependent repellency against the *C. maculatus*. The highest 24 hours repellency was caused by the aqueous extract as indicated by its low ED_{50} value of 8%. The different Hargel shoot extracts also induced significant antifeedant action against the test insect. The lowest feeding ratio (Fr) of 0.007 as well as the lowest percentage weight loss (0.7%) was recorded in ethyl acetate extract treated cowpea seeds.

Keywords:Hargel shoots, Cowpea beetle, Mortality, Repellency, Antifeedant, Weight loss

Ps 21: Evaluation of Hargal shoot powder aqueous extract (*Solenostemma argel* (Del) Hayne) against whitefly, *Bemisia tabaci*, (Homoptera: Aleyrodidae) on tomato

Hatim G. Mardi and Abdelatif A. Suliman
El Obeid Research Station, P.O. Box 429, El Obeid, Sudan.

A field experiment was carried out for two seasons 2009/2010 and 2010/2011, in sandy soil at Barra locality, North Kordofan State (Lat: 13 70 08N long: 30 35 50 E alt 52Im) to evaluate the efficacy of Hargal shoot powder aqueous extract (*Solenostermma orgel* (Del) Hayne) at 10, 20, 30 and 40g/litre of water to control the whitefly (*Bemisia tabaci)* on tomato and compared with the standard insecticide super Alpha (alpha-cypermethrin) 10% EC at 0.04 L/feddan and untreated control. A randomized complete block design with four replications was used. The number of *B. tabaci* adults.5 plants and the percentage of indene***** with the tomato leaf curl virus TYLCV were measured. Hargal at 40g/litre showed comparable performance to standard insecticide in reducing the number of *B. tabaci* adults and on the percentage of plants infected by TYLCV. The yield obtained from the later tree and the standard was 37.2 and 37.5 ton/ha respectively virus 9.6 ton/ha.

Keywords: Hargal, Powder, Aqueous,Whitefly

Ps 22: Evaluation of the seed dressing insecticide Cruiser® 350 FS (thiamehoxam) against the green bug, *Schizaphis graminum* (Homoptera: Aphididae)

Hassbelrasul A. Mohamed[1], Mohammed E.E. Mohmoud2and Suliman A. Ibrahim[2]
1- Agricultural Research Corporation, New Halfa Research Station
2- Agricultural Research Corporation, Hudeiba Research Station

The economic importance of the green bug ,*Schizaphis graminum* (Rond.) as major insect pests of wheat is well known. This experiment was conducted at Hudeiba (HRS) and New Halfa research station (NHRS) during seasons 2006/2007 ,2007/2008 and2008/2009, respectively.Wheat variety "Argin" was sown in HRS while "Condor" was planted in NHRS. Cruiser® 350 FS at 0.75, 1.0, and 1.25 ml/kg seeds with Gaucho 70 WS at 0.5 g/kg seeds (standard) and

the untreated control were tested to evaluate their effects as seed dressing insecticides in controlling aphids and termite on wheat. The results revealed that Cruiser® 350 FS at three dosage rates and the standard treatment significantly reduced the population of aphids and consequently increased the wheat grain yield compared to the untreated control.

Keywords: Greenbug, Termite, Argin, Gaucho, Cruiser

Ps 23: Efficacy of Defender 2% WS (tebuconazole) and Imidal 70 WS(imidacloprid) to control damping-off diseases and early insect pests in Sesame

Elsafi M. Mohammed[1]and Anas A. Fdadelmula[2]
1-Agricultural Research Corporation, Plant Pathology Section, Gedarif
2-Agricultural Research Corporation, Entomology Section, Damazin Research Station

This investigation was made to evaluate the efficacy of the fungicide Defender 2% WS (Tebuconazole) and the insecticide Imidal70 WS(imidacloprid) to control damping-off diseases and early insect pests in sesame crop under rainfed conditions in Gadarif at two sites . Sesame seeds treated with Defender at the rate of 0.5g and 0.75/hg seeds gave a highly significant increase percentage of seedlings emergence (84.5% and 80%) respectively. However, the mixture of the fungicide Defender at rates of 0.5g or 0.75g with imidal at 3g/kg seed, significantly gave the highest percentage of sesame seedling emergence (85.1% and 79%) compared to other treaments..

All fungicide treatments, singly or in mixture with imidal insecticide significantly controlled the incidence of post emergence damping off in sesame seedlings compared to the untreated control. Mixed treatments of both chemicals at the rates of (0.7g + 3g and 1.0g + 2g/kg seed had significantly reduced the incidence of post-emergence damping off to the least percent (2.3% and 2.4%) respectively, However, the mixed treatment of 0.75g of defender + 3g of Imidal improved the crop stand and significantly gave the highest yield (72.2kg and 69.8 kg/fed) in both of the two sites compared to the all other treatments.

Keywords: Fungicide, Defender, Damping-off, Seedling, Emergence

Ps 24: Towards ameliorated locusts and grasshoppers management in Western Sudan

Abdalla M. Abdalla
Department of Plant Protection, Facaulty of Natural Resources and Environmental Studies, University of Kordofan

Outbreak of locusts and grasshoppers may endanger food and feed resources in Western Sudan and elsewhere in the region. Their upsurge endangers food and cash crops, some forest trees and natural pastures in the area as well. Control of these notorious pests has relied, traditional, on the use of environmentally hazardous synthetic chemical insecticides. In this paper, an overview on the experience of the University of Kordfan in amelioration of locusts and grasshoppers management is given. Results of field trials on the bio-ecology of the tree locust and the Senegalese grasshopper are presented. The roles of some bio-pesticides in the control are highlighted. Provision of these bio-ecological data may enhance the decision making and ameliorates management of these pests in the near future. Moreover, application of soft chemistry pesticide may, unequivocally, leads to cost effective and environmentally begin locusts and grasshoppers management activities in the upcoming.

Efficacyof the *Mucuna pruriens* were tested against the desert locust and the African migratory locust, the evaluated against the tree locust. The tested material gave promising results where more than 90% mortality was reported.

Keywords: Locusts and Grasshoppers management, Bio-pesticides

Ps 25: Natural enemies of the tomato leaf miner,*Tuta absoulta,* *(*Lepidoptera:Gelechiidae)in Kassala State, Sudan

Mohammed E.E. Mahmoud
Kassala and Gash Agricultural Research. Sudan

Chemical control is the only management option applied to control the tomato leafminer,*Tuta absoluta* in Sudan.

Other control options are essential to reduce reliance on pesticides especially biological control agents. Survey conducted in Kassala State revealed four parasitoids and two predatory bug associated with *T. absoluta.* The parasitoids *Bracon* (*Habrobracon*) cncolorans Marshall and *Bracon* (*Habrobracon*) hebetor

(Say) (Hym.: Barconidae), *Ecdamuacadenati* (Risbec) (Hym.: Torymidae) and *Neochrysocharisformosa* (Westwood) (Hym.: Eulophidae). The predators encountered were *Nesidiocoristenuis* Reuterand *Macrolophus sp*. (Hem.: Miridae).

Keywords: Tomato leafminer, Biological control, Predator,Parasitoids

Ps26: Effects of Basil (*Ocimunbasilicum*) leaves powder and ethanolic extract on the 3rd larval instars of *Anophelesarabiensis*, (Diptera :Culicidae)

Hiba E. M. A. Mahmoud[1], Nabil H. H. Bashir[1], Yousif O. H. Assad[2]
[1]The Blue Nile National Institute for communicable Diseases (BNNICD), University of Gezira, Wad Medani, Gezira State, Sudan
[2-]Department of Pesticides and Toxicology, Faculty of Agriculture Sciences, University of Gezira, Wad Meani, Sudan

Malaria is transmitted by *Anophelesmosquitoes* (Diptera: Culicidae) and the disease is a significant health problem in the Sudan, affecting 53% of outpatients and accounting for 9% of all hospitals deaths. The present study investigated the potentialities of the plant ***Ocimunbasilicum***leaf powder (LP) and leaf powder – ehanolic extract (LPE) as a larvicide of Anopheles arabiensis instar larvae (L3), and comparing their results with those of commonly used organophosphate larvicide. Across sectional study was conducted in Barakat area, the southern suburb of Wad Medani, the capital city of Gezira State, to collect the larvae that were subjected to identification at the first stage as *A. arabiensis*. The L3 was used for testing the susceptibility to Basil extracts and temephos as larvicide, where 20 g of leaves powder were extracted with ethanol using a soxhelet apparatus for 6 hr. Five concentrations (2, 4, 6, 8, 10 mg^{-L}) were taken separately from basil extract. TenL3 larvae were transferred. The study showed that the LC_{50} and LC_{90} of the LPE were 58mg/L and 143mg/L, respectively. LC_{50} of 9.19 g/L and LC_{90} of 19.88 g/L were recorded for the LP. The LC_{50} and LC_{90} of Tenphos were 0.033 mg/L and 0.16 mg/L.

Keywords: Basel, *Ocimum basilicum*, *Anopheles arabiensis*, Extract, Natural products

Ps 27: The efficacy of extracts of the plant *Argemone mexicana* on mosquito species, *Anopheles arabiensis (*Diptera:Culicidae*)*

Elfahal. A.[1] Abdelgader. H1Elhussein, S.A. Osman, N. A.[2]
1-gricultrural Research Corporation, P.O. Box 126, Wad Medani, Sudan
2-Univdrsity of Gezira P.O. Box 20, Wad Medani, Sudan

Research work carried out in Sudan *Argemone Mexicana* suggested the potential of the plant as a source of larvicides against mosquito. Mosquito, *Anopheline arabiensis*, is on focus in Sudan because of its role as vector of several tropical diseases. This study the extracts of the Argemone Mexicana were selected to investigate their larvicidal potential against mosquito objective. Laboratory rear mosquito species, *Anopheline* arabiensis, the major malaria vector in Sudan, was used. Two forms pf argempme extract, leaves powder and seeds oil as emulsion concentrate, were tested. Larval mortality increased in a dose dependent manner. A100% mortality was reached by (0.25%) concentration. The minimum inhibitory dose was below (0.005%). Significant mortality was observed between 5.5 and 6.5 hours from the time of incubation of the bags. This indicated the time required for release of larvicidal activity from the bag. The fact that 48 h pre-incubated medium was larvicidaly active for further 13 hours implies good stability for more than 2 days application. Argemone leaf powder preparations, simply wrapped in floating permeable cloth bags, release the larvicidaly active constituents in about 8 hours. The retain high activity for nearly 60 hours after their introduction to the test medium. The Argemone plant produces a numerous number of seeds that separate easily during drying of shoots from the fruits. These seeds produce a fixed oil 30-40% that was shown to have larvicidal activity when used as EC formulation.

Emulsifiable Argemone oil preparations achieved a good larvicidal activity, exhibited during the first hour of their application.

Ps 28: The impact of insecticide treated bed nets on malaria parasite transmission potential in Kamul district, Uganda: where is Uganda on the road to elimination

Fredrick Kabbate1, Anne Akol[1], Enock Matovu[2] and Ambrose Onapa[3]

1-Departmenof Biological Science, College of Natural Sciences, Makerere University, Kampala, Uganda
2-Department of Molecular Biology, College of Veterinary Medicine and Animal Biosecurity, Makerere University, Kampala, Uganda, and Envision[3]/NTD Programme, RTI, Uganda

Keywords: Plasmodium falciparum circumsporozoites , ELISA, *Anopheles gambiae, A.funestus*, biting cycle, entomological indculation rate, sporozoite rate, Uganda

The main entomological justification for use of insecticide-treated bed nets (ITNs0/long Lasting Insecticide-treated bed nets)LLINs) as the main malaria vector control methods in Uganda is that most biting by *Anopheles funestus* group, the principal vectors is believed to occur between 10:00pm and 5:00am when most people are in bed and under bed nets. Hypothetically, this biting pattern changed following prolonged use of ITNs/LLINs, rendering this intervention less effective, explaining the continued morbidity and morbidity due to malaria in endemic Uganda.

A longitudinal study was conducted to determine the *Plasmodium falciparum* sporozoite-infective biting hours of the night and the parasite transmission intensities under prolonged use of ITNs/LLINs in Kamuli district. APf. Cricum-sporozoite protein ELISA was carried out on551 (112 pools) and 1640 (331 pools) Anopheles gambiae s,I. and *A. funestus* group caught at different hours of the night in intervention (with ITNs) and non-intervention (without ITNs) zones respectivel. The circumsporozoite positivity of the vectors was related to the time of biting humans, while the annual entomological inoculation rates (AEIRs) were obtained by multiplying the average annual human biting rate by the sporozite rate. Results showed no impact of ITNs/LLINs on the sporozoite-infective biting hours of the night and probably reduced sporozoite infection rates. Infective biting by vectors occurred throughout the night, with peak infection occurring between 20.00 and 04.00 hours in both zones, indicating protective effectiveness of ITNs against malaria sporozoite-infective biting by the vectors. In both zones, the malaria transmission potential was higher outdoors than indoor, and was several fold higher in the non-intervention than

in the intervention zone, indicating that ITNs may have reduced the phase like most of country. An integrated approach to malaria control should be adopted in Kamuli District and other parts of country to reduce the transmission intensity to levels that could interrupt P *falciparum* malaria transmission, and possible driving Uganda closer to the malaria elimination phase.

Ps 29: Molecular Identification of savannah form of *Anopheles Gambiae*sensu strict in Kamuli District, Uganda

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Kabbale F.G[1], Akol. A.M., Matovue2, Kazibwe A.2, Yadouleton A.[3], Andonapa. A4

1-Department of Biological Sciences, College of Natural Sciences, Makerere University, P,O. Box 7062, Kampala

2-Molecular Biology Laboratory, Department of Molecular Biology, College of Veterinary Medicine and Aninmal Biosecurity, Makerere University, P.O. Box 7062, Kampala

3-Centre de Recherche Entomologique de Cotonu (anges33@yahoo.com)

4-Envision/NTD Programme, RTI Kampala, Uganda (kwibale@yahoo.com)

Keywords: Sibling species, Molecular form, *Anopheles gambiae* complex, Anthropophily, IPM

Anophelesgambiae sensu sticto (s.s) is one of the recognized morphologically indistinguishable sibling species of the Anopheles Gamviae complex . In Uganda, this largely anthropophilic species is reportedly the most important malaria vector. To confirm this postulation, we carried out surveys in kamuli Derert, human-biting mosquitoes were collected from 7.00pm kto 7.00am for four consecutive night in each of 48 households using human-baited bed net traps for subsequent identification. Sibling species under the gamviae complex were characterized by polymerase chain reaction using species specific. Single Nucleotide Polymorphism (SNPs) in the intergenic spacer region (IGS) using primers specific for *An*. *Gambiae s.s.An. Arabiensis*, An. Melas, Anmerus, *An quadriannulatus*. Molecular forms of the An were further discriminated using primers specific for mopti and Savannah forms. out of 300 *An. gambiae s.I.* amplified 98% (n = 294) were *An*. Gambiae s.s. samples analysed for molecular forms, 78.9% (n=112) were identified as gambiae Savannah (S) form, while the other 21.1% were identifiable. These results are in agreement with previous reports that revealed *An.gambaies.s.*was consistent with an earlier report that revealed the Savannah (S) form as the most common and widespread in sub-Saharan Africa, and the only form found in East Africa. This finding is also consistent with ecological requirements for Savannah form.

Basing on the antropophilic, endophagic behavior of *An. gambiae s.s*) (and management and improved house deign in the context of integrated vector management, may be the appropriate vector control strategies in the area.

Ps 30: Farmer' knowledge about fruit flies problem and their control in guava and mango orchards in three States in Sudan

Omar A.A. Sidahmed[1], Ishtiag Abdalla[2], Ahmed H. Allagabo[3] and Awad K. Taha[4]

1-Department of Crop Protection, Faculty of Agriculture, Omdurman Islamic University
2-Agricultural Economics and policy Research Centre, Agricultural Research Corporation
3-Department of Agricultural Information, Federal Ministry of of Agriculture
4-Department of Plant Protection, College of Agricultural Studies, Sudan University of Science and Technology

Keywords: Farmers, Fruit fly, Sudan, Trap system

A survey on about 50 fruit orchards was conducted in 2011, in the Central States of Sudan (Sinanar, Gezira and Khartoum), using a semi structured questionnaire. Descriptive analysis was used for data analysis. Results indicated that about 24% of sampled fruit farmers are not educated. Also, most of the samples (75%) own the orchard and grow less that 100 fruit trees in the orchard with an average area of 10 feddans. Only 12% of the sample groups have high experience about fruit fly infestation in their orchards. Therefore, farmers (66%) sell the infested fruits especially those in Khartoum (90%). About 52% of the sample farmers received extension services and information from Plant Protection Directorate (PPD) about how to use pheromone whereas 43% of them use it and some did not receive any information services. Moreover, 17% of respondent farms used the recommended application rate of Methyl Eugenol with 4 ml/ cotton wick. Furthermore, no synthetic insecticides were used against fruit flies in these orchards up to survey time. In conclusion, fruit producers are still lacking extension information on effective control measures used against fruit flies.

Ps 31: Fruit insect pests of guava (*Psidium guajava* L.) and mango (*Mangifera indica* L.) and their control in Sudan. A Historic Review

Esameldin B.M. Kabbashi
Food Research Centre, Shambat, Khartoum, Sudan

Abstract

Keywords: Control, Disinfestations, Guava,Mango

The first report of the Medfly (*Ceratitis capitata wied*) was in 1990s followed by the report of *Ceratitis(pardlaspid)quinaria Bezz*. (the Rhodesian fruit fly) and *Ceratitiescosyra* Walker (the mango fruit fly) in 1980s on guava. However, the first report of insect pest on mango was in mid 1990 reflecting a heavy infestation of these fruit by C. *cosyra.* This latter report drew the attention clearly to launch control program due to the heavy damage and/or the mango value. The peach fruit fly (*Bactrocera zonata* Saunders) control program concluded to the incidence of another species (*Bactrocera novus*) in 2004 that was not really so but (*Bactrocera invadens* Dres – Trusta and White) in 2004 two *B. ivadens* was reported from mango. This followed by report of this species from guava in Kadaro ocrchards (30 km North Khartoum Centre) together with the dried fruit beetle (*Carpophilus hemipterus* L.). In addition to an unidentified maggot (20 – 30 mm) used to lodge at the distal end of the guava fruit reddish rear part. This fold of insects pushed the charge of protection to list with the national pests in 2005. However, an un identified coleopteran was also reported from mango fruits in orchards and cold stores as well in 2010. In 2012 the peach fruit fly (B.Zonata) was reported from a number of states in Sudan. All these studies were accompanied by other studies for the host range which included banana (*Musa sapientum* L.), exotic and localsidir [(*Zizphus spina – Christi* (L), Def.], Osher [(*calotropis procera* (Action) W, T. Action)] However, a report in 1990 mentioned no incidence of *C. capitata* from citruses in Shambat, Khartoum North. Moreover, the great most of the attempts to control these pests couldn't succeed in disinfesting mango and guava from these pests. These include use of pheromone traps, cultural practices (such as dumping the fruit in pits, cleaning weeding and pruning), spraying with natural and synthetic insecticides, use of maturity indexes and fruit morphology, cropping pattern etc… However, more reliance must be on the postharvest control methods toascertain the total disinfestations by the various insect pests. Some attempts include hot water treatment, storage period, hot dry air treatment, hot humid beam, laser beam ultrasound and gamma. Any success of

this control panorama upgrate thd fruit quality for local and international markets.

Ps 32: Vegetable leafminers *Liromyaza spp.* incidence insquah (*Cucurbita pepo* L.) and identification of its natural enemies in Gezira , Sudan

El hadary D. E. Abdulla[1], Faiza E. E. Salah[2] and Ahmed E. M. Hassan[3]
Agricultural Research Corporation, University of Gezira

Keywords: Leafminer; Liriomyza spp.; squash; Sudan

Squash is an important vegetable cropand is attacked by serious insect pest like the vegetable leaf miners. This study was conducted to instigate the resistance of two squash breeding lines, P.s (x)zypm and the variety Skandarani, to leafminers as well as its natural enemies. The study was conducted at the Gezira Research Station Farm, Agricultural Research Corporation, Wad Medani during the winter seasons of 2007/2008. The experiments were laid out in a randomized complete block design (RCBD) with 3 replicates. Resistance was evaluated by the percentage infestation and number of active mines. Significant differences were found between the breeding lines and Skandarani variety in the percentage infestation, but no differences were observed as to the number of active mines. The parasitoid *Neochrysocbharisformosa* (Westwood) was dominated during both seasons, beside the presence of other parasitooids; *Cirossopalpusaenescens*sp., (ord:fom) *Hemiptarscnus semialbicalvi* (ord:fom), *Peediobius* sp(ord:fom), *Pediobius* sp (ord:fom), Keleidotoma favus (ord:fom) .However, P-s(x) was least infested by the leafminers so it could be used in IPM programmes.

Ps 33: Egg laying and feeding behviour of potato tuber, *Phthorimaea operculella* ((Zeller),(Lepidoptera: Gelrchiidae) Gekcehidae in Gezira, Sudan

Elgaili, E. Elmubarak[1], Ali.E. Ali[2]
1-Faculty of Agriculture and Natural Resources/Abu Haraz, University of Gezira
2-Entomology Research Program, Agricultural Research Corporation, Wad Medani
Keywords: Tuber moth, Egg laying, Larva

Cage trials were concucted to study the egg laying and feeding behavior of potato tubermoth, (PTM)(*phthorimaea operculella* (Zeller)(Lepidopera: Gelechiidae) on tomato and eggplant. It was found that the eldest branches and youngest leaves of tomato and eldest leaves of eggplant were preferred for egg

laying and feeding of PTM larva. The average number of eggs/female/day ranged between 11-16 on tomato plant and the % hatchability was between 39%-60.71%. On eggplant the numbers of eggs/laid/female was ranging between 17-35 eggs/female with an average of 13.56 and the % hatchability range between 64%-100% with an average of 87.40%. The eggplant leaves were the most preferred by PTM for egg laying followed by gubbein, sakaran, cotton, hambouk and ambiro. No preference between the upper and lower surfaces of the leaves of eggplant and gubbein, but the preference was clear for the other tested plant. PTM larvae under no choice trial consumed 5.23cm^2 of eggplant leaf overnight and 6.63cm^2 of gubbein leaf. It enters between the two layers of the leaf surface and feed on the parenchymatroy tissues and leave only the membranous layers then the leaf withered by the wind. On tomato fruits, the larva enters the core centre and feed on the fleshy tissues and lowered the quality of the fruit. Sometimes, the larvae feed on the lateral sides of the fruit under skin and also the fruits become unmarketable.

PS 34: Seasonal abundance of major fruit flies (Diptera: Tephritidae) in Khartoum, Kassala and South Kordofan States, Sudan

Mohammed E.E. Mahmoud[1], Mohamed A.O. kambal[2], M.A. Abukashwa[3], Abdelrahman Bakheit, [1]ARC, [2]U of K, [3]PPD

Abstract

Keywords: Tephritidae, Seasonal abundance, Control programs, Peaks

Male lures were in South Kordofan and Kassala States in Sudan during 2008 and 2009. This study was conducted to monitor the seasonal abundance of three major fruit species (Tephritidae: Diptera) in order to initiate a sound of control program. *Bactrocera inbadens* was recorded from all three states. *Ceratitis cosyra* C. *capitata* and *C. quinaria* were reported in Khartoum. *C. capitata* was not detected in South Kordofan while *C. cosyra* was not reported in Kassala. Fruit flies, especially *B. invadens*, were found throughout the year in the three locations. The number of male *B. invadens* caught from guava orchard in Kassala State was the highest among all sites. The largest population of B. *invadens* in Khartoum in 2008 was recorded during September, December and in Kassala from October to November, In South Kordofan two packages reported; during June – August and the second from November – December,. The largest population of *C.* cosyra recorded in May, September, October and

November 2008 in Khartoum State and during January, May, 2009 in South Kordofan. The population of *C. capitata* in Khartoum State peaked during the period August – November while the population of *B. cucrubitae* culminated during January – March, 2009 in South Kordofan. The abundance of fruit flies can be attributed to the available of host plants at different fruiting stages and to ambient weather conditions. The results indicated best control campaigns for Tephritid flies must be conducted monthly through the year to bring the population below the injury level using male lures with recommended doses.

Ps 35: Studies on biology of the fruit fly, *Ceratitis capitata*, (Diptera: Tephritidae) on guava glsidium at Sinnar State

Mahadi M. Z. Ahmed and Hassan O. Kannan
1-Agricultural Research Corporation, Sinnar, Sudan
2-Agricultural Research Corporation, Gezira, Sudan

Keywords: Fruit fly, Biology, Egg laying, Developmental period

The investigations on the biology of the fruit flies (*Ceratitis spp*.) were carried out during seasons 2006 – 2007 and 2007 – 2008 at Sennar State. The biological studies showed that the mean eggs deposed and collected during 2006 – 2007 season was more that season 2007 – 2008 (355 and 257.5 eggs, respectively), percentage mean hatching observed 1-3days after eggs laying was much as 90.25-87.2 during 2006 – 2008 seasons, respectively. Despite the flies were more fertile and proliferous in 2006 – 2007 season, yet the percentage hatching was higher in 2007 -2008 season. This could be explained by unfavorable environmental conditions which suppressed hatching that reduced the egg population prior to the hatching process commended. The female fruit fly lived longer than the male of *C.capitata* species; 28.8, 46.5 and 28.4, 46.0 days in season 2006 -2008, respectively, The total mean developmental period of the male and female of C. capitata was 18.9 and 21.6 days in 2006 – 2007 season while 18.7 and 21.4 days were reported in season 2007 – 2008. This ensure that under the availability of favorable environmental conditions the female high number of eggs and lived longer.

Ps 36: Movable-circle frame hives in beekeeping development programmes in Sudan

Faiza H.E.M. A. Akasha
Bahri University, F*a*culty of Agriculture
Department of Crop Protection

The improvement of traditional cylinder hives (hollow-out log live/tangle) were studied in Khartoum State, Kadaro Locality during the period 2006/2007 in neetar flow period (winter months). The research work aimed to promote improvements in the quality of life for rural communities through improvement of the management of native bees in movable circle frame hives to raise yields and other bee products.

Plastic and weeden-circle frames were prepared with comb-space 32.0mm and supporting top-bar. Also Sudanese wax foundation sheets was used. The honeybee colonies accepted the new modification which help in easy management and honey removal.

Keywords: Bees hives, Kadaro, Community, Comb

Ps 37: Preventive and curative measures to control flea beetle,*Podagrica spp.*,(Diptera: Halticidae) on cotton in the Sudan

Hayder Abdelgader
Agricultural Research Coproration, P.O. Box 126, Wad Medani, Sudan

Keywords: Seed treatment, flies beetle *imdicahaprid, Boronopol*

Seed treatment promotes seedling establishment, helps ensure yield and reduce quality either or losses.Only early-season insect pests and diseases is of importance to ensure a healthy and strong establishment of this strategic crop. The present study tried to measure the susceptibility of cotton flea beetles (*Podagrica spp.*), as indicator of early insect pests, to the most commonly used neonicotnioid insecticide imidacloprid as a single seed treatment or in mixture with two antimicrobial fungicide as preventive control, measure against early season pest of cotton in Sudan. Three different kinds of experiments: Visual

yield infestation count choice semi-field laboratory tests and choice laboratory tests were used to evaluate the effects of seed dressing treatments. Flea beetle damage was assessed by counting shot-holes resulting from adult feeding. Results showed that using the antimicrobial bronopol alone did not prevent flea beetle damage. Treatments containing imidacloprid reduced damage in the three experiments, but not 10 weeks after sowing in field experiments.

The study also included two experiments to study the susceptibility of field collected adult flea beetle to foliar application of different doses of are they recommended for F.B. control to serve as a possible curative control strategy when needed.

The percentage reduction of damage in treatment relative to the control was calculated. The results showed an increase in the numbers of dead beetles and/or decrease in damage to tested leaves as with the dosage rate increase. The dose re once of endosulfan show, $I.C_{50}$ and $I.C_{99}$ values of 20.41 and 2862ppm, respectively, whic can be taken as indication of a good performance of endosulfan against the adult flea beetle, since the $I.C_{99}$ is still lower than the field recommended dosage rate of endosulfan (5000 ppm). The dose response of dimethoate showed LC_{50} and LC_{99} of 29.8 and 2610.7 ppm, respectively. These values indicated that the field recommended rate of dimethoate (2560) is slightly lower than LC_{99} measured during the recent study.

Ps 38: First report on the occurrence of the peach fruit fly, *Bactorcera zonata* (Saunders) (Diptera: Tephritidae) in Sudan

Faiza E.E. Salah1, Hayder Abdelgader2 and DE Villiers, Marelize[3]
1-University of Gezira, Sudan
2-Agricultural Research Corporation, Sudan
3-Citrus Research International, South Africa

Keywords: Bactrocera zonata, Peach fruit fly, Survey, Sudan

The peach fruit fly, *Bactrocera zonata* (Saunders) (Tephritidae), was captured in fruit fly detection trap during July 2011 in three locations in Gezira area, Sudan. The first samples were identified by Marc ed Meyer (Royal Museum for Central Africa, Belgium) and lan White (The Natural History Museum, London).The results revealed the presence of *B. Zonata* in all traps at various periods in Wad Medani area. The percentage of*B. zonata* of the total catch ranged between 4 and 82% during the survey period in Wad Medani area. In

Singa and Elkamlin area, B. invadens was present in all traps at various periods. However, B. zonata was present with a very small proportion only on two occasions in Singa and one occasion in ELkamlin.

Ps 39: Evaluation of some plant extracts against Khapra beetle, *Trogoderma granarium*Everts (Coleoptera: Dermastidae)

Ayman M. E. A. Rajab and Awad K. Taha
Department of Plant Protection, Faculty of Agricultural Studies, Shambat, Sudan University of Science and Technology

Laboratory studies were carried out to determine the effects of some indigenous plant extracts on larvae of Khapra beetle, *Trogoderma granarium.*Everts. In the first experiment, treatments comprised application of mixed proportions of leaf powder extracts of Usher (U) and fruit powder extracts of Jatropha (J) at three doses 10%, 15% and 20%. The treatments were arranged in completely randomized design (CRD) with three replications. Treatment concentrations were added to test containers with (10g) dry sorghum seeds, admixed with (10) 3rd instar larvae of *T.granrium.* Insecticidal effects of the plant mixture combinations at the 1st day and 10th day showed no significant difference (P>0.05) at all concentrations. However, there was significant difference P>0.o5) in the mortality of the insects at the time of exposure untreated of 20th days and 30th days compared to control . The results also showed that, the more the concentration of Jatropha extract, the more effective will be the combination.

In the second experiment, plant extracts of Usher and Jatropha were evaluated for their activity on *T. gramarium*, using Weevil Bioassay Index (WPI) test, in the rations of 10%, 20% and 30% (W/W). The test allows plant materials with strong, weak or negative grain protectant effects to defect. The results showed that of d3 plants screened. *Datura alba* showed the best grain protectant effects, with a WPI value of (24.63) at dose of 30% (wt/wt).

Keywords: Khapra beetle, Leaf powder, Usher, Sensory Jatropha

Ps 40: Seasonal and relative distribution of *Chrysoperla spp*. (Stephens) among different crops and locations in Merowe locality, Northern Sudan

Abdalla A. Satti and Nazar A. A. Bilal

Environment and Natural Resources Research Institute (ENRRI), National Centre for Research, Khartoum, Sudan

Keywords Major crops,Seasonal abundance; *Chrysoperla carnea;* Merowe, Northern Sudan

The green lacewing, *Chrysoperla carnea* is the main common insect predator prevailing on Northern Sudan. Therefore, regular field surveys were carried out during 2009/2010 to study the seasonal abundance of *C.arnea* on four major crops (viz., Berseem, hyacinth bean, okra and snake cucumber) and in four locations (Noori, Merowe, El-Gorair and Shiba) in Merowe locality, Northern Sudan. The predator was found to attack different insect pests on these crops throughout the year, including mainly several specices of aphids (*Aphis spp*.) in winter and immature stages of whiteflies, (*Bemisia tabaci*) and other soft body insects in other seasons. The study revealed that *C. carnea* is abundant all the year round. No significant differences were detected between the population levels of predator on each crop, whether between seasons or among the different locations. Nevertheless, winter season revealed relatively higher population than the other seasons. Also, no significant differences were found among the different crops in all locations. Accordingly, it is concluded that the green lacewing (*C. carnea*) is adapted to various habitats and prey species in Merowe area, and proved to be the most abundant natural enemy of agricultural pests. This species is recommended tobe studied as potential candidate for biological control of different pests in this area.

Ps 41: Studies on action threshold level of the African bollworm,*Helicoverpa armigera* (Hubner)(Lepidoptera: Noctuidae) on cotton at different stages of plant growth

Amir A. Y.Malik and Elamin M. Elamin
Agricultural Research Corporation (ARC), P,O, Box 126, Wad Medani, Sudan

Keywords: Action threshold level, Helicoverpa armigera Cotton, Sudan

The Africa bollworm, *Helicoverpa armigera* (Hubner) [Lepidoptera: Noctuidae] is the most important cotton insect pest in all cotton growing areas of the Sudan and most protection strategies are directed for its management. The previous action threshold level for chemical control interference was increased in 1993 from 10 larvae and./or eggs/100 plants to 30 eggs or 10 larvae/100 plants and no insecticide spraying to be conducted before flowering. The objective of the study was to quantify the recent action threshold levels alongwith other infestation levels at different growth stages of the crop. The level is being subjected to revision since 1999. The studies were conducted at the Gezira Research Station Farm during 2001/ 2002, 2002/ 2003, 2003 / 2004, 2004 / 2005 and 2012 / 2013seasons at the pre-flowering, flowering and bolls formation stages and the yields of Barac (67) B was estimated. The action threshold levels were 10, 15, 20 and 30 eggs and/or larvae/100 plants, in addition to untreated and *Helicoverpa* free infestation as control treatments The results showed no significant differences between the suggested action threshold level; 10, 15 and 20 in pre-flowering and flowering stages of action growth as compared to the control treatments, but 20 eggs and/or larvae/100 plants relatively reduced the number of chemical sprays and that offered better chance to the natural enemies to play a role in pest suppression, especially in the early season. While, 10 eggs and/or larvae/100 plants was more applicable at boll formation stage, because any damage on bolls was directly reflected on yield.

Ps 42: Integrated pest management (cotton) in India

M.S. Kairon

Cotton growers are facing a crisis of increasing production costs due to heavy reliance on insecticides. A historical analysis of cotton pest management reveals the same recurring patterns as in other regions of the world characterized by a series of successional phases viz., subsistence phase, exploitation phase and integrated controlled phase.

In cotton pest management strategies have to cope up with complex of pests, so that the choice of insecticides and other tactics will depend upon the pests concerned and their relative importance as member of the complex. Sucking pests during early phase of crop growth and bollworms during the mid and late seasons are the key pests, their control is essential for good production of cotton crop. IPM is an essential component for a sustainable cotton production system having two essential elements. First comprises of series of measures which help in keeping the insect pests below economic threshold levels (ETL). Such control methods include natural control agent, host plant resistance, manipulation of agronomic factors such as rotations, spacing, time of sowing and fertilizer application

Natural Control

Natural occurring native predator viz, Chilomenes sexmaculatus and chrysoperla carnea offer significant control or the early season suking pests. A predatory prey ratio of 1.5 in respect of jassids and 0.1 for aphids was found optimal for natural control inpresence of cocceinelids and chysopids. As the use of broad spectrum insecticides e.g. Organophosphorus compounds for sucking pest control tolerant genotypes in conjunction with natural enemy exploitation is advocated. Hmenopterous and tachinid parasitoids (comkpoletis chloridae, Microchilonus sppp, P. taxa, Carcia illota and G. halli) are common on H. armigera larvae with parasitisation ranging from 9-12% while Rogas aligarhensis parasitisation on E.vittella larvae varies between 4 and 18% Pink bollworm control by A.*ppanteles angaleti* and Bracon greeni is 2 and 8% respectively. Natural mortality of *A. Flava* and armigera due to N. releyii could be up to 8% during cooler months and years of wpizootics vennila and Ravindran, 1998). It also includes:

Host Plant Resistance

Cultural control

Second element of IPM comprises of control methods involving intervention that are necessary to make, if the pest reach economic threshold level (ETL). The ERLs for different cotton insect pests are given in table 12-2. At present these intervention measures usually involve the use of conventional chemical insecticides (Table 12-3) but increasingly alternative intervention technologies are developed and introduced including the pheromones, microbaials and products of biotechnology (e.g. Bt. transgenics). IPM propositions should avoid any standardized set of pest management techniques but should promote an approach utilizing agroecological principles and translate them into a socioeconomic frame work respecting farmer's objectives.

Ps 43: Impact of spraying Diafenthiruon (*urea-derivative*) on different levels of whitefly incidence, *Bemisia tabaci* (Genn), (Homoptera: Aleyrodidae), quality and yield of cotton

Khansa M.Mekki[1], Hassan O. Kannan[1] and Ahmed E. M. Hassan[2]

[1]Agricultural Research Corporation, Wad Medani

[2] University of Gezira, Wad Medani

Abstract

The cotton whitefly, *Bemisia tabaci*, (Homoptera: Aleyrodidae) is an important insect pest that causes serious losses to the cotton yield and quality and transmits leaf curl virus disease. This study was carried out at the Gezira Research Station Farm, Agricultural Research Corporation (ARC), Wad Madani, Sudan during 2003/04-2004/05 seasons. The objectives were to quantify the influence of diafenthiruon, a urea derivative insecticide (Polo 500SC) on three levels of whitefly population to find out the optimum pest level for spraying the product and the effect on lint and yield quality. The tested levels were 200,300 and 400 whitefly adults/ 100 leaves compared to the untreated control. Diafenthiruon was sprayed at 0.252 l/fed (126 g. a. i) using a Knapsack sprayer. Cotton quality was evaluated at the Spinning and Stickiness Testing Laboratory, ARC.

The results showed that spraying diafenthiruon at the range of 200-300 whitefly adults/ 100 leaves suppressed the whitefly population compared to the untreated control. Moreover, significant differences were detected between the different levels as to seed cotton yield and the untreated control whereas all levels gave yields significantly different compared to the control. The highest

yield was 8.0 k/fed. recorded at 300 levels compared with 5.4 khantar /fed. in season (2003/04). In season 2004/05 the highest yield 7.7 k/fed. was recorded by the same level compared to 5.6 in the untreated control The quality test indicated that degree of lint stickiness was very low particularly at the 300 level of whitefly population. The results concluded that the 300 level of whitefly/100 leaves achieved the highest yield with the lowest stickiness when diafenthiruon *was applied.*

Keywords: whitefly levels, diafenthiruon, yield, stickiness

Ps 44: The effects of sowing dates and varieties on the infestation with the sesame webworm, *Antigastra catalaunalis* Duponchel (Lepidoptera: Phycitidae) in sesame

Nazik A. abdalla, Ahmed H. Mohamed

Agriculture Research Corporation, Wad Medani, Sudan.

The sesame webworm, *Antigastra catalaunalis* Duponchel (Lepidoptera: Phycitidae) is a major insect pest of sesame in the rainfed and irrigated sectors in the Sudan. The objectives of this study were to determine the optimum sowing dates for sesame to escape the infestation with the pest and to determine the susceptibility of different varieties of sesame to the insect incidence. The study was carried out in season 2011/2012 in the Gezira Research Station Farm under irrigated conditions. The tested sowing dates were 1st August and 15th August while the varieties were Gedarif, Promo, Pachiano and M2007L18. The experimental design was split plot design with four replicates. Monitoring of the infestation incidence was on weekly basis. The sample size for the insect count was 25 plants / subplot. Number of larvae/plant was counted. The data was collected and subjected to analysis of variance was made. The results suggest that the optimum sowing date is earlier 1st August. The mean infestation was 17.8 larvae / 25 plants in 1st August and it was 21.1 larvae/ 25 plants in the 15th August. The mean infestation levels in the varieties Gedarif, Promo, Pachiano and M2007L18 were 19.3, 21.1, 20.3 and 22.3 larvae / 25 plants respectively. Then there was no significant difference in the susceptibility of the varieties.

Keyword: Sesame, *Antigastra catalaunalis*, Sowing date, Sudan.

Ps 45: **The joint action of liquid soap and water extract of some plant products against four stored grain insect beetles**

Susan Mohamed Abdalla El-Nazir

Shambat Research Station

The joint action of 10 ml liquid soap mixed with one litre water extract of 50g/l argel (*Solenostemma argel* Del. Hayne) leaves, red chili pepper (*Capsicum annuum* L.) fruits, clove (Syzygium aromaticum L.) flower buds, orange (*Citrus sinensis* L.) peel and dry neem (*Azadirachta indica* A.Juss) leaves and 100g/l green neem leaves against the khapra beetle, *Trogoderma granerium* (Ev.), the red flour beetle, *Tribolium castenium* (Herbst), the rusty flat beetle, *Cryptolestes ferrugineus* (Steph) and the cowpea weevil, *Callosobruchus maculatus* (*Fabricius*) was bioassayed in laboratory experiments. Liquid soap-red chili pepper mixture solution gave the best results for the control of *T.granerium* (37.87 ml/m^2) followed by liquid soap-orange peel mixture (41.98 ml/m^2). While, liquid soap-clove mixture gave the best results for the control of *T. casteneum* (29.64 ml/m^2) followed by liquid soap-orange peel mixture (33.62 ml/m^2). Liquid soap-orange peel mixture was the best for the control of *C. ferrugineus* (29.03 ml/m^2) and *C. maculates* (22.51 ml/m^2) followed by liquid soap-dry neem leaves mixture (29.14 ml/m^2) for *C. ferrugineus* and liquid soap-argel mixture (27.39 ml/m^2) for *C. maculates* control. The cowpea beetle resisted both red and green chili pepper-liquid soap mixtures.

Ps 46: **Susceptibility of five cultivars of stored date fruits to the date moth, *Ephestia calidella* (Guen.) (Lepidotera: Pyralidae), *Oryzaephilus surinamensis* (L.) and *O. mercator* (Fauv.) (Coleoptera: Silvanidae)**

Susan Mohamed Abdalla El-Nazir

Shambat Research Station

No choice and multy choice susceptibility experiments were performed for *Ephestia calidella*. The growth indicies values for the no choice test calculated according to Howe (1971) indicated that Gondaila cultivar was the most susceptible (0.021), followed by Tamoda (0.020), Mishrig Wad Khateeb (0.019), Mishrig Wad Laggai (0.014) and Barakawi (0.010) was the least susceptible cultivar. The susceptibility indicies (Dobie, 1974 and Le Cato, 1976) of the multy choice test emphasized the former results, accordingly Gondaila possessed the highest susceptibility index (0.026), followed by Tamoda (0.019), Mishrig Wad Khateeb (0.017), Mishrig Wad Laggai (0.014) and Barakawi (0.012) was the lowest. Gondaila was found to be the most susceptible cultivar, followed by Tamoda, Mishrig Wad Khateeb, Mishrig Wad Laggai and Barakawi was the least susceptible for *O. surinamensis*. For *O. mercator*, Tamoda then Gondaila, Mishrig Wad Laggai, Mishrig Wad Khateeb and also Barakawi was the least susceptible. The approximate composition of the five tested date cultivars showed that Gondaila had higher values of total sugars (73.13%), sucrose (33.63%), Protein (3.18%) and ash content (1.89%), and lower values of reducing sugars (37.73%) and crude fibre (0.70%) than the other cultivars. Barakawi had the highest values of titrable acidity (0.62%) and crude fibre (2.45%).

Ps 47 Pesticide application technique aerial application Vs ground application

Magdi A. ElMedani[1] and Abdelatti Suliman[2]

[1]Modern

Aerial or ground methods of insecticide application displayed a complementary role to the affectivity of the insecticide molecule against the target insect pest in agriculture. Micronaire AU 5000 was effected for both ULs and ECs (Aerial application) while micron- ULVA and knapsack sprayers were used for both ULs and ECs formulation. Biological and physical parameters for evaluation of both methods of application were quantified. The results of UL formulations when using micronaire AU 5000, in case of aerial application to control early season cotton insect pests (Jassid and African bollworm) were reviewed. The result obtained recorded mortality rate of (98.5-99.5%) for aerial application compared to (96 %) for ground application. No significant differences for jassid and the ABW on percentage mortality were established. The results of EC formulation, using micronaire AU 5000 for aerial application and knapsack sprayer for ground application against mid and late season peak (Aphid and whitefly) were also quantified. The means mortality of cotton aphids when using low volume 79.1% (Aerial application) compared to 79.05% when using knapsack sprayer (ground application). Mortality rate of whitefly using low volume was 88.8% (Aerial application) compared to 48.0% in ground application using knapsacks sprayers. Results of the physical measurement using UL formulation, showed the ratio of VMD/NMD 1.03 and 1.23 for upper and lower leaves for ground application compared to 1-13 and 1-38 for aerial application. Results of coverage using ECS formulation, the ratio of VMD/MMD was recorded (3.0 and 3.46) for upper and lower leaves using ground application compared to (1.14 and 1.15) for upper and lower leaves when using aerial application.

Keywords: Application, Micronair, Knapsack, UL, EC

Weed Science Posters

Ps 48 Morphology of *Xanthium strumarium*

Mohamed A Morgan, A G T Babiker and N H Bashir

Xanthium strumarium Is newly introduced weed in many parts of the Sudan. The weed is common and troublesome in many parts of the world. In Sudan, the weed was first reported in Gash Delta in 1950s.In recent years, the weed has become problematic and assumed economic importance in many parts of the country such as New Halfa, Suki and Rahad. The weed has become a problem in Gezira scheme and has been reported in Southern and northern regions of Sudan. The local name Ratouk (means take me with you) given by Hadandawa tribe in eastern Sudan to *Xanthium strumarium* reflects the importance of the weeds and its method of dispersal. The morphology, methods of dispersal and economic importance of the weed are discussed in this paper

Key words: Sudan, morphology, dispersal, *Xanthium strumarium*

Ps 49 Evaluation of clethodium for Weed Control in Alfalfa (*Medicago sativa* L.)

Khogali I. Idris and Gawahir M. Dongola

Agricultural Research Corporation, Shambat Research Station

Weeds are serious economic pests of Alfalfa. A field trial was conducted at Shambat Research Station Farm, Khartoum, Sudan during 2011/2012 and 2012/ 2013 winter seasons, to determine the magnitude of yield losses due to weed competition and to evaluate the activity and selectivity of the herbicide Clethodium (Select super120 EC) for weed control in alfalfa. The herbicide was tested at 0.3, 0.4 and 0.5 *L*/fed, as post- emergence, 3 weeks after sowing of alfalfa. The most prevailing weed species were sweet signal grass {*Brachiaria eruciformis* (Sm) Grieseb.}, purple nut sedege (*Cyperus rotundus*) and croton {(*Chrozophora plicata* (Vahl.) A. Juss. Exspreng}. Results showed that the losses due to competition in dry matter yield of alfalfa was 57 and 37 % in the first cut, in the first and second seasons, respectively. All herbicide treatments showed a good selectivity to the crop. The herbicide at all rates tested gave consistent and effective weed control of grassy weeds (81 – 100% control). Hence, most of the herbicide treatments significantly increased alfalfa green and dry matter yields in comparison with the weedy check.

Key words:

Alfalfa, Weed control, herbicides,

Ps 50 Impact of Field dodder (*Cuscuta campestris*Yuncker) on onion (*Allium cepa* L) growth and yield

Eldur B. Zahran*, Mohamed S. Zaroug; Abbasher A. Abbasher and Eltahir A. Abed Aliem

Faculty of Agriculture and Natural Resources Abu Haraz,University of Gezira.

* Corresponding author, email:edurzahran@gmail.com

Onion (*Allium cepa* L) is one of the most important vegetable crops worldwide considering area and production. During the year 2009 a high incidence of field dodder (*Cuscuta campestris*Yuncker) was observed for the first time in fields sown with onion in the southern block of the Gezira Scheme. The objectives of this research were to evaluate the effects of field dodder infection on three different cultivars of onion namely local red, yellow and white as well as to confirm the susceptibility of onion to field dodder infestation. The experiments were conducted at the demonstration farm of the Faculty of Agriculture and Natural Resources in two seasons in 2010 and 2011. The impact of dodder on the onion traits; bulb fresh weight, bulb diameter and number of bulbs/m² were assessed for each cultivar. Dodder infestation weakened onion plants, reduced the yield and did not allow the bulbs to reach marketable size. Field dodder significantly reduced onion bulb fresh weight, bulb diameter and number of bulbs/m². These findings confirmed the susceptibility of onion to field dodder infestation and it could be considered a troublesome parasitic weed to onion in Gezira State.

Key words: Field dodder; onion cultivars; parasitism; susceptibility

Ps 51 Linkage map saturation and fine mapping of *Striga* resistant QTLs in Sorghum (S*orghum bicolor* (L.) Moench using (N13x E36-1) RIL population

Rasha Ali[1], Abdalla H. Mohamed[1], S.Deshpande[2], Adil A.Elhussein[3] , C. Mugoya[4], C. Masiga[4] , D. Kiambi[5] , G.A. Elbadri[1] and C.T. Hash, [2]

[1] Agricultural Research Corporation (ARC) P.O.Box 126 Wad Medani – Sudan.

[2] International Crop Research Institute for the Semi- Arid Tropics (ICRISAT), Patancheru, India.

[3] University of Khartoum, Faculty of Science. Khartoum -Sudan

[4] Associations for Strengthening Agricultural Research in Eastern and Central Africa, AGROBIO Program, P.O. BOX 765 Entebbe, Uganda.

[5] African Biodiversity Conservation and Innovation Center (ABCIC), P.O. Box 100882 - 00101, Kenya

Striga is a devastating parasitic weed in sub-Saharan Africa and parts of Asia. *Striga* resistance is a complex trait controlled by five QTLs, Molecular markers linked to the resistant QTLs can accelerate development of *Striga*-resistant lines. Genetic maps provide an important genomic resource for understanding genome organization and evolution. Linkage mapping is used to identify and map genes and quantitative trait loci (QTL) with phenotypic traits. The aim of this study was to saturate *Striga* resistance QTLs using SSRs & DArT markers and to fine map *Striga* resistance QTLs.

QTLs associated with *Striga* resistance were well saturated and the confident intervals were reduced, 22 SSR marker mapped to sorghum linkage map, we precisely mapped 271 markers tightly linked to the *Striga* resistance gene on SBI-01, SBI-02, SBI-05a, SBI-05b and SBI-06 at a distance of 3-5 cM, respectively. The fine-mapped QTL regions were validated under Sudan conditions by genotyping and phenotyping of RIL population for *Striga* resistance. The markers co-segregated with *Striga* resistance in all tested lines and the QTLs were in the same position as proposed by Haussmann 2004. The identified markers would be useful in marker-assisted selection for introgressing this trait into susceptible sorghum cultivars.

We successfully proposed a saturated linkage map with (271) markers and addition of 22 SSR tightly linked to *Striga* resistance QTLs and DArTs covering the 10 linkage groups offers real advantage for MAS application. We also test the validity of the QTLs identified by Haussmann in Sudan environment to insure that the QTLs are stable and can be introgress to elite backgrounds sorghum.

Plant Pathology Posters

Ps 53 Characterization of the casual agent of powdery mildew of okra (*Abelmoschus esculentus* L.) and evaluation of some varieties and land races for resistance

Amira. N. O , Omer. O. A, Yousif. F. M, Muna. E. S.
Plant Pathology Center, Faculty of Agricultural Sciences, University of Gezira, P.O. Box 20, Wad Medani, Sudan.

Abstract
Okra (*Abelmoschus esculentus* L.) is one of the most popular vegetable crops in Sudan. It is highly affected by powdery mildew disease which became a major challenge to okra production. This study was carried out to determine the causal agent of the disease and to screen some local okra accessions for powdery mildew resistance. Eighty seven accessions and two check varieties (Khartoumi and Clemson) were tested during winter season . During the rainy season, 27 accessions were selected and evaluated in comparison to the two check varieties. Disease incidence and severity were recorded. The causal agent was identified according to morphological characters of conidia, conidiophores, conidia germination, presence or absence of fibrosin bodies and the perfect stage, cleistothecia (Chasmothecia). *Sphaerothica fuliginea* (*Podosphaera xanthii*) conidia were produced in chains on unbranched conidiophores. Cleistothecia were detected toward the end of the season as they were globose, white in colour when immature, then brown and black when mature. The cleistothecium measuring 0.01- 0.2 μ, was found to contain one ascus and simple appendages. To our knowledge, this is the first report of cleistothecia of *Sphaerothica fuliginea* occurred on okra in Sudan. Disease incidence was found to be increased by time. It was most severe during winter (November- April) (95.1%) than during the rainy season (August- November) (86.2%) under field conditions. Disease severity was high during winter than the rainable season. Leaf shedding during the two seasons was similar (96.6%). Resistance to the disease was not detected on all land races (accessions) and varieties of okra tested. Some accessions viz HSD 0874, HSD 0018.5.1, HSD 0018.5.3, HSD 0018.6.4 and HSD 0018.6.1 showed high level of resistance.

Keywords: okra; powdery mildew; *Sphaerotheca fuliginea*; Cleistothecia .

Ps 54 *Fusarium acutatum* a causal pathogen of chickpea root rot at New Halfa, Sudan

A.M.A. Kurmut[1]

[1]Agricultural Research Corporation, New Halfa Research Station, P.O. Box 17, New Halfa, Sudan
Email: kurmot@yahoo.com

Chickpea is an important food legume in the Sudan. River Nile and Northern States were known as the tradition areas for chickpea production in the Sudan. During recent years a steady increase of chickpea production in none traditional areas such as Gezira scheme and New Halfa was observed. Samples of chickpea plants showing symptoms of root rot were collected from different district of New Halfa. Identification of the pathogen isolated from infected chickpea plant samples collected from New Halfa, showed that, *Fusarium acutatum* Nirenberg & O'Donnell is the most common pathogen associated with root rot of chickpea plant samples. The pathogencity test confirmed that, *Fusarium acutatum* Nirenberg & O'Donnell was the causal organism of chickpea root rot at New Halfa.

Key words: chickpea, root rot, *Fusarium acutatum*

Ps 55 Identification and molecular characterization of some yellowing - inducing virus (es) and virus-like disease on faba bean (V*icia faba*) in Gezira area –Sudan

Mai abdalla Ali[1],Ebrahim Abd Elhameed Saeed[1] and EL Shafie E. EL Shafie[1]
[1]Plant Pathology Center, Gezira University , P.O. Box 20, Wad Medani, Sudan.

The study of the yellowing inducing viruses on faba bean fields at the Gezira area for two successive growing seasons reveal the presence of four different types of virus and virus-like symptoms ,accompanied with or without yellowing symptoms. These symptoms were dark and light green mottling , stem and leaf blackening ,stunting , leaf deformation and phyllody. Serological and molecular tests confirm that these symptoms were caused by a phytoplasma and groups of viruses, luteoviruses, potyviruses and illarviruses. Out of the different luteoviruses tested only *Pepper yellows leaf curl virus* and *Pepper vein yellows virus* were detected , from the poty viruses *Pea seed-borne mosaic virus* was detected , from the ilarvirues *tobacco streak virus* was detected and finally the phyllody phytoplasm.Nine varieties/lines were screened against the different prevalent diseases , none of the them showed stable consistent tolerance or resistance. However, the variety Hudeiba and the line C.9/02 were considered promising and could be incorporated in breeding programs for controlling most of the faba bean diseases.

Key words: faba bean, leutoviruses, poty viruses, illarviruses, phyllody, phytoplasma.

Ps 56 Control of Tomato Leaf Curl Virus Disease in Shambat area, Sudan

Fawzia Salih Hadda.

Crop Protection, University of Khartoum, Sudan

At present, the tomato leaf curl disease (TLCV) is considered as one of the most important diseases limiting the production of tomato in the Sudan. The disease is caused by a Gemini virus, which is transmitted by the whitefly, *Bemisia tabaci*. Several trials have been conducted for the control of this disease but without much success. In the present study, a field trial was conducted in the Experimental Farm of the Faculty of Agriculture, Shambat to evaluate an integrated crop management protocol to control TLCV. This protocol included five types of soils, classical spraying with confidor 200SL (an imidacloprid insecticide), to control the vector, mosquito net as a physical barrier to the vector. The results of this study showed that the best soil for growing tomato seedlings was peat moss flowed by Shambat field soil. Covering of the tomato seedlings combined with Confidor application 5-7 days prior to transplanting have significantly decreased the whitefly infestation, disease incidence and the disease severity. However, the tomato fruit yield was significantly increased by 277% while the number of fruits increased by 244%.and the fruit weight was increased by 41%

Key words: TLCV, ICM, chemical control, white fly, fruit yield

Ps 57 Seed-borne fungi of groundnut (*Arachis hypogaea* l.) in Sudan with special emphasis on *macrophomina phaseolina.* (tassi)(goid)

Sara Hamad Shomo Sharaf Eldin[1] and Ahmed Mohamed Baghdadi[2]
[1] Plant Protection Directorate, Khartoum North, Sudan. [2], University of Khartoum

Seeds of groundnut (*Arachis hypogaea* L.), Sodari, Ghobeish, Barberton and Medani were obtained from Sinnar Seed Propagation Administration and tested for seed-borne pathogens. The result revealed the presence of *Macrophomina phaseolina* in cv Medani (0.5%-52 %) using agar methods. Other detected fungi were *Aspergillus flavus* (36%) *Fusarium* spp (24 %), *Aspegillus niger* (*20 %*) and *Rhizopus* spp (4 %).The physiological studies revealed that the optimum temperature for the growth of *Macrophomina phaseolina* was 30°C - 35°C, and the suitable medium for growth of the fungus was PDA. The percentage of rotted seeds were (19%) in Sodari, (23 %) in Ghobeish, (6 %) in Barberton and (18%) in Medani. Two chemicals were used to control the fungus: Benlate and Tilt. Benlate completely inhibited the growth of the fungus, while Tilt reduced its growth.

Key words: *Arachis hypogaea, Macrophomina phaseolina, Aspegillus niger, Aspergillus flavus, Rhizopus* spp

Ps 58 Cultural and morphological variation in *Fusarium oxysporum* f. sp. *ciceris* causing wilt of Chickpea in Sudan

Omyma Elmahi Mohamed[1], Nafisa Elmahi Ahmed[1] and Seid Kemal Ahmed[2]
[1]ARC, Plant pathology Program. [2] Biodiversity and Gene Integrated Management Program, ICARDA.

Fusarium is a large genus of filamentous fungi widely world-wide distributed in soil and in association with plants. The genus includes a number of economically important plant pathogenic species like *F. oxysporum* which have been studied for more than 100 years causing root and stem rot, vascular wilt or fruit rot. Plant pathogenic *F. oxysporum* strains have a broad host range and individual isolates usually cause disease only on a narrow range of plant species. *Fusarium oxysporum* f. sp. *ciceris,* the causal pathogen of Fusarium wilt in chickpea, isolates were obtained from wilted chickpea plants samples collected from different fields in different agro climatic regions of Sudan and Syria. A total of 90 isolates named with their locations were subjected to cultural, morphological and pathogenicity studies. Accordingly, all the isolates were found to belong to *F. oxysporum. f.sp ciceri*. However, when cultured on PDA media distinct variations were noted among the isolates with respect to rate and shape of mycelial growth, colony color, sporulation, septation of the conidia, number and shape of macro and micro conidia and abundance and absence of chlamydospores. The isolates were studied for their pathogenic variability by inoculating to a set of chickpea differentials by standard soil mixing method. The pathogenicity of the isolates could be categorized based on their virulence.

Key words: *Fusarium oxysprum*, chickpea, root rot, conidia

Ps 59 Efficacy of Nine Selected Plant Extracts against Juveniles of *Meloidogyne javanica* (Treub, 1885)

Nigood M.Omer[1], Gamal A.A. Elbadri[2], and Adam M.A. Gadeseed[3]

1- University of kordofan, faculty of Natural Resources and Environmental studies, plant protection department, ElObeid-Sudan.
2- Agricultural Research Corporation, crop protection, Research center, P.O, Box, 126, Wadmadani –Sudan.
3- University of Gezira, Faculty of Agricultural science, Plant Pathology Center, Wadmedani - Sudan.

Fourteen different samples that include various plant components (seeds and leaves) were collected from Gezira and El Obeid localities, Sudan. The concentration of plant species extracts were 10000, 1000 and 100 ppm respectively. Hexane extracts of 14 plant species extracts were treated against juveniles after 24, 48 and 72hr respectively in the laboratory. The extracts from the seeds of *Azadirachta indica, Cassia occidentalis*, *Cassia tora*, *Azadirachta indica* (leaves) and *Lawsonia inermis* were found to be extremely toxic to juveniles (95,91, 88, 85 and 80 %) respectively after 72 hrs at 10.000 ppm and these lethality was highly significant compared to the other extracts. Whereas, the extracts from *Ruellia patula* (seeds), *Cassia tora, Cassia occidentalis*, *Guiera senegalensis* and *Aristolochia bracteolate* (leaves) gave low mortality against juveniles (68-55%). At 100 ppm all the extracts exhibited lowest toxicity rate ranged from (63-16%). All of seed extracts were found to have better nematicidal activity than leaf extracts. The mortality rate increased with increasing exposure time for all plant species extracts.

Key words: Juveniles, *Meloidogyne javanica,* nematicidal activity, Plant Extracts

Ps 60 Assessment of mango Anthracnose disease in Southern Kordofan, Sudan.

Hatim Guma Mardi
El Obeid Research Station, Agricultural Research Corporation, Sudan.
Corresponding Author's Email: htmhashim@yahoo.com

The incidence and severity of mango anthracnose disease (*Colletotrichum gloeosporioides* Penz and Sacc.) were assessed for two years from January 2008 to December 2010. A total of ten sites in South Kordofan, Sudan were surveyed. No orchard was found disease-free recording 100% disease incidence. Throughout the period of the study, in AbuGiebaha and Tagmala sites the incidence of anthracnose on mango started as mild infection on new twigs at the starting of rainy season in first July. The incidence was increased until it reached its peak in late November. Fruits produced during the rainy season (June–October) showed high

disease severity. No fruit infection was reported in the main production cycle during March-May. It appears that mango anthracnose in South Kordofan is only severe during the rainy season mango production cycle, but not in the main production cycle.

Key words: mango anthracnose disease, *Colletotrichum gloeosporioides*

Ps 61 Simultaneous analysis of Fluopyram, Tebuconazole, Trifloxystrobin and its metabolite residues in soil by Ultra Performance Liquid Chromatography coupled to tandem mass spectrometry

Husham N. M. Hussan[a], Xingang Liu[b], Jun Xu[b], Fengshou Dong[b], and Yongquan Zheng[b]*.

[a] Agricultural Research Corporation - Crop Protection Research Center -Pesticides Analysis Laboratory . Wad Medani – P.O. Box: 126 –Sudan .

[b] State Key Laboratory for Biology of Plant Diseases and Insect Pests, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing 100193, P.R.China

[b]* Correspondence: Prof. Yongquan Zheng. Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Key Laboratory of Pesticide Chemistry and Application, Ministry of Agriculture; Beijing 100193, China E-mail: zhengyongquan@ippcaas.cn, Phone: +86-01-62815908, Fax: +86-01-62815908

hushamab6@yahoo.com

In this work, an analytical multi-residue method based on the extraction with acetonitrile using ultra-performance liquid chromatography tandem – mass spectrometry (LC-MS-MS) for simultaneous determination of four fungicides in soil was developed. The four fungicides (Fluopyram, Tebuconazole, Trifloxystrobin and its metabolite) were extracted from soil matrix using acetonitrile and subsequently clean up using only octadecyilance (C18) as sorbent prior to LC-MS-MS analysis. The limits of detection were ranged between 0.5 to 1.4 $\mu g/kg^{-1}$, while the limits of quantification were ranged between 1 to 4 $\mu g/kg^{-1}$ in soil matrix. The matrix-matched standard gave satisfactory recoveries and relative standard deviation (RSD) values in Soil matrix at three spiked levels (0.01, 0.1, and 1mg kg-1). The overall average recoveries for this method in all soil samples at three levels ranged from 75.2% to 97.6% with RSDs in the range of 0.03 to 12.8% (n=5) for all analytes.

Key words: Fluopyram, Tebuconazole, Trifloxystrobin, acetonitrile, LC-MS-MS

Ps 62 Plant parasitic nematodes associated with sugarcane (*Saccharum* spp.) and their density in Guneid Estate

G. A. A. Elbadri[1]; P. Wani[2]; K. Bukhari[2] and A. E. Elnour[1]

[1] Gezira Research Station, Agricultural Research and Technology Corporation ARTC, Wad Medani, Sudan

[2] Sugarcane Research Centre - Guneid (SRC-G), C/O Sudanese sugarcane Company Ltd, P.O. Box, 511, Khartoum, Sudan.

Corresponding auther: E mail: gamal_elbadri@yahoo.com

A study was undertaken on the density and identification of nematode genera found associated with the roots and rhizosphere of sugarcane (inter-specific hybrids of Saccharum spp.) in Guneid sugarcane Estate. Organized survey samples were taken from minors 4, 7, 8, Eltalha, Saeed, Abu sugra and Wad Elfadul. Soil and root samples were collected from around the sugarcane stools inside the scheme. A total of 350 samples from roots and soils were investigated. Plant parasitic nematodes found associated with roots were; Root lesion nematode Pratylenchus yassini, P. muchandi and Radopholus similis. By comparison those associated with soil around the roots of plants with poor growth or decline symptoms were. Longidorus, Xiphinema, Helicotylenchus zeidani n.sp. Scutellonema, Hoplolaimus and Tylenchorhynchus sudanensis n. sp. and T. elamini n. sp. In general, substantial high densities of plant parasitic nematodes were found in Eltalha, Wad Elfadul, Abu Sugra, and Saeed were compared to other sampled areas. Given the perennial nature of sugarcane and in the field stand period, it is expected that high populations of plant parasitic nematodes selections are bound to develop in the near future.

Key words: plant parasitic nematodes, sugarcane, *Xiphinema, Helicotylenchus, Longidorus*

Ps 63 Efficacy of fungicide Defender 2% WS (Tebuconazole) and Imidal 70 WS to control damping-off diseases and early insect pests in Sesame

[1]Elsafi Mustafa Mohammed, [2]Anas Ahmed Fdadelmula
[1]Agricultural Research Corporation, Plant Pathology Section, Gedarif Research Station, Gedarif, Sudan. [2] Agricultural Research Corporation, Entomology Section, Damazine Research Station.

In this work we evaluate the efficacy of fungicide Defender 2% WS (Tebuconazole) and insecticide Imidal70WS to control damping-off diseases and early insect pests in sesame crop under rainfed conditions in Gedarif at two sites. Sesame seeds treated with Defender at the rate of 0.5g and 0.75/kg seeds gave a high significant increase in percent of seedlings emergence (84.5% and 80%) respectively. However, The mixed treatments of fungicide Defender at rates of 0.5g or 0.75g, with insecticide Imidal at 3g/kg seed, significantly gave a highest percentage of sesame seedling emergence (85.1% and 79%) compared to others. All fungicide treatments, singly or in mixed treatments with imidal insecticide significantly controlled the incidence of post emergence damping off in sesame seedlings compared to the untreated control. Mixed treatments of both chemicals at the rates of (0.75g + 3g and 1.0g + 3g/kg seed) were significantly reduced the incidence of post-emergence damping off to the least per cent (2.3% and 2.4%) respectively. However, the mixed treatment of 0.75g of defender fungicide + 3g of imidal insecticide improved the crop stand and significantly gave superior highest yield (72.2 kg and 69.8 kg/fed) in the both of the two sites compared to the all other treatments.

Key words: Defender, Tebuconazole, sesame damping-off diseases, insect pests

Ps 64 Effects of sowing date, tillage and pre- watering on head smut disease incidence of sorghum

Elsafi Mustafa Mohamed Ahmed[1] and Mohamed Elfatih Khalid ali[2]

[1]Agricultural Research Corporation, Plant Pathology Section, Gedarif Research Station, Gedarif, Sudan. [2] Agricultural Research Corporation, Plant Pathology Section, Shambat Research Statio

The effects of sowing, tillage and pre-watering on disease incidence on the susceptible local sorghum landrace Gadambalia were studied in greenhouse experiments at Gezira Research Station and on farm at Gedarif University Farm. At Gezira, the sorghum plant were grown on sterilized soil artificially inoculated with the teliospores of the pathogen(---conc) in seasons 2006/07 and 2007/08, respectively. Both sowing dates, tillage and their interactions significantly reduced the disease incidence compared to other treatments in both seasons and locations(--%). Pre-watering of the soil before sowing significantly reduced head smut incidence compared to no pre-watering treatment.

Key words: head smut disease, sorghum, local sorghum landrace Gadambalia

Ps 65 Efficacy of the systemic fungicide Raxil 2% WS (Tebuconazole) to control covered kernel smut disease in sorghum

[1]Elsafi M. Mohamed., [2]Salah M. Eltayb. And Nafisa E. Ahmed.
ARC, Crop Protection Centre,
[1] Gedarif Research station, ARC, Crop Protection Centre,
[2]Gezira Research Station, Wad Medani.

The contact fungicide, Thiram, is the only seed dresser been used since the early fifties against covered and loose smuts of rain fed sorghum. Systemic seed dressing fungicides used in sorghum are limited to some parts of the irrigated sector. In this trial, the efficacy of the systemic fungicide Raxil 2% WS was evaluated against covered smut of sorghum at Gezira and Gedarif States in seasons 2001 - 2003.The rain fed fungicide was tested at 1, 2 and3 g/kg seed on sorghum seeds artificially inoculated with spores of the causal fungus at the rate of 2g/kg seeds. Fernasn D 50% DP (containg 25% the contact fungicide Thiram) and Vincit 5% FS were used at the recommended rates for comparison. Raxil at the three rates tested resulted in 98.5% to 100% disease control. The fungicide at the rates tested at both locations significantly increased grain yield over the untreated control and gave comparable yields to those obtained by the standard treatments. The product at all tested rates did not affect either seed germination or crop emergence. Raxil 2% WS was recommended at the rate of 3g/kg seed (equivalent to 0.06g a.i./kg seeds) for the control of covered smut of sorghum in rain fed sector.

Key words: systemic fungicide, Raxil 2% WS, covered kernel smut disease

Ps 66 Efficacy of Apron Star 42% WS on control of covered, kernel and loose smut diseases in sorghum

[1]Salah M. Eltayb, Elsafi M. Mohamed And Nafisa E. Ahmed. [1]Crop Protection Centre,plant pathology research section, ARC Gedarif Research station, ARC

Covered and loose smuts of sorghum caused by *Sporisorium sorghi and S.cruentum*, are the most destructive diseases to sorghum. These diseases are controlled mainly through chemical seed dressings. In this study we evaluated the efficacy of a new systemic fungicide/insecticide combination, Apron Star 42% WS (Mefenoxam 20% + Difenoconazole 2% + Thiamethoxam), against these diseases. Effects of Apron Star 42% WS on sorghum seed germination and seedling emergence and growth were studied in laboratory and nursery experiments. The product was tested at the rates of 2, 3, 4, 5 and 10g/kg seeds and compared to Fernasan D 50 DP as a standard treatment at 3g/kg seeds. Slide germination method was used to evaluate the effect of the product on spore germination of the diseases causal fungi at different concentrations (10 – 200 ppm). The contact fungicide Fernasan D 50 DP and the systemic fungicide Raxil 2% WS were used as a standard treatments for comparison. The new product Apron Star 42% WS was evaluated for its efficacy against covered smut in field experiments under irrigation at Gezira and under rain-fed at Gedarif in seasons 200203 and 2003/04. against loose smut, the product was evaluated at Gezira in seasons 2003/04. Seeds of the sorghum cultivar Wad Ahmed were surface inoculated with viable spores of the disease causal fungi at the rate of 0.2% w/w, the inoculated seeds were then treated with the product under test at the rates of 2, 3, 4 and 5g /kg seeds as slurry (20ml/kg seeds). Fernasan D was used at the recommended rate as a standard treatment for comparison. Apron Star 42% Ws at 2, 3, 4 and 5g/kg seeds significantly enhanced sorghum seed germination (12 – 18%), however at 10g/kg seeds the product was toxic. At concentrations tested, Apron Star 42% was more potent in inhibiting spore germination of both fungal species than the two standards. At all rates tested, the new product resulted in 71 – 99% and 100% disease control of covered and loose smuts in the mother crop, respectively. In the rationed crop the product controlled loose smut by 76 – 85%. Apron Star 42% at the tested rates out yielded the untreated control of covered smut by 58 – 128%.

Key words: Apron Star 42% WS, covered smut, loose smut, kernel smut, *Sporisorium sorghi and S.cruentum* fungicide Fernasan D 50 DP

Ps 67 Evaluation of some sorghum genotypes for resistance to sorghum head smut disease

Elsafi Mustafa Mohamed Ahmed
Agricultural Research Corporation, Plant Pathology Section, Gedarif Research Station, Gedarif, Sudan

Ninety seven sorghum genotypes were evaluated at Gadarif and Rahad Research Station Farms for their reaction to sorghum head smut disease (*Sporisorium reilianum)* in seasons

2005/06 and 2006/07. All genotypes at both locations were artificially inoculated with the fungus spores. Two sorghum genotypes, Ingaz, and Buda red were resistant to the disease, while the genotypes Edo 4 – 1- 15, Arfa Gadamak, Tetron, Arafa, Eheemir and Gew 36-10 were moderately resistant. The other genotypes including the released cvs. Tabat, Wad Ahmed, Gadam Elhamam and Aroos Alrimal were either moderately susceptible or susceptible to head smut disease.

Key words: sorghum genotypes, sorghum head smut disease, *Sporisorium reilianum*

Ps 68 *Ganoderma zonatum* a serious problem of date palm in Sudan

Altaf M.Elhassn. Merowi Research Station, ARC. Sudan

Basal rot disease of date palm caused by *Ganoderma zonatum* was first observed in 1992 in Elbawga area River Nile state. Ten years later the disease spread in the Northern State, Halfa and Dongola Elajoze. In 2008 the disease reached Merowe locality. In a survey conducted in 2010 in Elbawga scheme river Nile state the disease incidence was reported to be 100%. Disease symptoms include general decline, slow growth and off color foliage. In addition half moon knocks Basidoicarps of the fungus were attached to the base and sometimes other parts of the trunk. *Ganoderma zonatum* was identified as the causal agent of basal rot disease of date palm.

Key words: *Ganoderma zonatum,* basal rot disease, Basidoicarps

Ps 69 Spread of *Thielviopsis paradoxa* causing date bunch fading disorder in Sudan

Altaf M. Elhassan**.** Merowi Research Station, ARC. Sudan

Date bunch fading is a serious problem of date palm *Phoeniex dactyl lifera* L in Sudan. In recent years this disorder occurs suddenly and rapidly between Khalal and Rutab stages causing fade and eventually drought of dates in both karo and high taras soils. The loss in yield ranged from (30-50) % in both soils. *Thielviopsis paradoxa* was isolated from the xylem of fruit bunch samples from different infected locations in the Northern State. Isolation and pathogenicity test were done in Shambat nursery by crown injection. Shriveling of the fruits was induced by peduncle inoculation in Merowe Research Station. This is the first report of Date bunch fading disorder in Sudan.

Key words: *Phoeniex dactyl lifera* L, Date bunch fading, *Thielviopsis paradoxa,*

Ps 70 Short note on first record of alfalfa mosaic viruses and potato virus M on potato

[1]Nafisa Hussein Baldo [2]Siddig Mohammed Elhassan [2] Mustafa Mohammed Ali Elbella

[1]Agricultural Research Corporation, Shambat Research Station, P.O.Box 30, Khartoum.
[2] Khartoum university, Faculty of agriculture, P.O.Box 32.

Field surveys were carried out in Khartoum state and River Nile state to detect and estimate the occurrence of viruses spreading in commercial potato seeds and potato ware houses. Virus identification was established by dot immuno blotting assay (DIBA). Commercial potato fields intended for seed and ware houses production were visited in the main potato growing areas of River Nile State. The surveyed potato fields were examined carefully for visual virus symptoms depending on characteristic visual symptoms, particularly for yellowing types and various virus symptoms such as mottling , mosaic and leaf deformation. Visual symptoms of potato plants affected with various viruses were critically examined and the more commonly recorded field symptoms consisted of different shades of yellowing, stunting of plants plus mottling and rugosity, leaf deformations. Identity of the different viruses was established by direct tissue immuno blotting assay. This is the first time to detect PVM and AMV in symptomatic potato plants in the Sudan.

Key words: alfalfa mosaic viruses, potato virus M, dot immuno blotting assay

Ps 71 DNA analysis of Tomato Leaf Curl Virus (TLCV) isolates from Sudan

Elnazeer, O.M[1]; Elbadri, G.A.A[2].; Idris A. M[3]; Isam, M. E. [1] and Yassin, A.M[1]

[1] University of Juba, Khartoum. [2]Agricultural Research Corporation, Crop Protection Research Center, Wad Medani, Sudan, and [3]University of Arizona (USA), Department of Plant Science, Tucson, Arizona, USA. Corresponding author: gamal_elbadri@yahoo.com

Tomato leaves with typical symptom of tomato leaf curl virus (TLCV) disease, were collected from Kassala area, in the extreme East, bordering Ethiopia, Gezira, some 170 km South-West of Khartoum, and Shambat, a few kilometers North of Khartoum. Samples were subjected to DNA analysis at the Molecular Biotechnology Laboratories of University of Arizona (USA); using the standard method of DNA analysis. Applying the "core" coat

protein sequences, all isolates from the three localities per se, produced 533 nucleotide (nt) long. This indicates that all isolates were more or less identical and belonging to tomato leaf curl virus (ToLCV) species. Using the phylogenetic tree analysis, of the nucleotide sequences generated, all ToLCV isolates fell within the same position of geminiviruses of the Eastern Hemisphere; and clearly distinct from those of the Western Hemisphere.

Key words: Coat protein, Sequences, Sudan. Tomato, leaf curl virus.

Ps 72 Survey of plant parasitic Nematodes associated with Banana in Sennar and Kassala States

Duria A. Eltahir[1]; Gamal A. Elbadri[2] and Ibrahim Saeed[3]
[1] Agricultural sector administration, Ministry of Agriculture and Irrigation.
[2] Agricultural Research Corporation, Wad Medani, Sudan. [3]Sudan University of Science and Technology

A survey was conducted at two main banana growing states, Sennar and Kassala in Sudan during June and October 2011 to determine plant parasitic nematodes associated with banana crop in these two locations and factors that enhance population buildup. Sennar state located at the Southern West of Sudan whereas Kassala State is located Eastern of Sudan. Samples of plant roots and rhizophere soil were randomly collected from 25 and 10 farms from Sennar and Kassala States, respectively. Banana varieties, irrigation system, soil type, source of planting suckers and cropping systems were subjected to laboratory investigations. The results showed that the nematodes density was higher in Kassala State than Sennar State. This could be due to lighter soil type in Kassala compared to heavy clay soils in Sennar. Moreover, the mixed cropping system adopted in Kassala area (citrus with banana) seems to offer favorable conditions for the increased number of nematodes and probably helped in generation of new races. The interconnected system of irrigation and planting of untreated suckers could also be contributed to nematodes problem in banana in the two States. The most prevailing nematodes species identified associated with plant rhizosphere in the two states were, *Pratylenchus Spp., Helicotylenchus Sp., Rotylenchus sp., Scutellonema Sp., Xiphinema Sp., Longidorus Sp., Tylenchus Sp., Radopholus Sp.* and *Hoplolaimus Sp.* However, the nematode species, *Radopholus similis* was predominantly isolated from roots of banana in the two States.

Key words : - Nematodes, survey, *Radopholus similis,* banana

Ps 73 Fungi and mycotoxins in stored sorghum in Sudan

Nafisa E Ahmed[1], Ibtihag Bur Eltom[2], Adam Ali Mohamed[3]

[1] Department of Plant Pathology, Agricultural Research Corporation, Wad Medani, Sudan
[2] Mycotoxin Center, Sudanese Standards and Measurements Organization, Khartoum, Sudan. [3]National laboratory for Chemistry, Federal Ministry of Health, Khartoum, Sudan

Sorghum (*Sorghum bicolor* (L.) is the most important staple food crop in Sudan. It resides in 75% of the total cultivated areas under cereals and contributed 85 % of the food crops produced. The grains and stalks are also important feed resource for livestock and poultry. In addition sorghum grains have a good share in the international trade. Sorghum grains samples (194) collected from 9 genotypes, stored in silos and traditional stores, in 14 localities were screened for fungal infection, aflatoxins and ochratoxins A contamination. Seven genera of fungi were isolated from all sorghum genotypes stored in the different storage types. It was apparent that there were differences in mould frequency between the different stores. However, all samples were contaminated by the same fungal species at an enough level to cause health hazards. The more frequently isolated fungi were *Aspergillus niger*, *A. flavus* and *Rhizobus stolonifer*. *Penicillium sp*, *Fusarium moniliformae*, *Curvularia lunata* and *Phoma sorghi* were of less occurrence. Aflatoxin B_1 was found in 25% of the samples analyzed ranging in levels from 1.2 to 7.0 ppb. In addition, 57.3% of the grain samples were contaminated with levels of ochratoxins ranging from 0.026 – 24 ppb while 7.2% showed a high level of contamination ranging from 168-1625 ppb. Levels of ochratoxins were less in grains stored in silos compared to traditional storage. Ochratoxin level varies with genotypes and with locations even on the same genotype. The study revealed that synthesis of aflatoxins and ochratoxin is due to suboptimal storage systems. Improved postharvest management options are available to reduce and mitigate toxins contamination, but the main challenge remains the development of strategies to scale out these improved practices and technologies to a large number of sorghum producers.

Key words: Sorghum, *Sorghum bicolor, Aspergillus niger*, *Rhizobus stolonifer, Penicillium sp*, *Fusarium moniliformae, Curvularia lunata, Phoma sorghi*

Ps 74 Identification and characterization of mango (*Mangifera indical)* malformation in Central Sudan

Mai Abdalla Ali[1], Maha Yousif Ahmed Abuadil[2] Yousif fadlalla[1],Gasim A.Dafalla[1], and Elamin Ismail[2]

[1] Plant Pathology Center, Faculty of Agricultural Sciences, University of Gezira, P.O. Box 20, Wad Medani, Sudan.
[2] Plant protection department , Faculty of Agriculture ,University of Sinnar

This study was conducted during the period of 2009 -2012, to evaluate the incidence of mango malformation disease in Sudan and identify possible causal agent(s). Samples of infected mango plants were collected from three major mango producing states, Blue Nile state, Sinnar state and the River Nile state. The study revealed that the main causal fungus of the vegetative malformation in Sudan is *Fusarium spp.* Which is likely to be a *Fusarium mangifera* strain. The disease can be transferred mechanically between the seedlings and the mango mite *Eriophyes mangiferae* might play a role in the transfer of the disease. Pathogenicity test using Fusarium isolates resulted in similar malformation symptoms. However, inoculation of different mango varieties seedlings with fusarium culture extract revealed appearance of four different symptoms suggesting either presence of more than one

strain of the fungus or a great impact of the varieties used on symptoms development. Disease management in the nurseries can be achieved by using resistance varieties or spraying systemic fungicide Bayfidan at the rate of 75 ml / fed.

Key words: mango, Fusarium spp, *Magnifera indica*, malformation

Ps 75 Incidence of cotton bacterial blight on Sudanese opened cotton cultivars in comparison with introduced opened and hybrid *Bt* cotton cultivars in Rahad scheme

Eltayeb[1], S.M; Ibrahim, S.A.[1] and Elbadri, G.A.A. [2]

[1.] Agricultural Research Corporation, Rahad Research Station, Elfau, Sudan. [2]. Agricultural Research Corporation, Crop Protection Research Centre, Wad Medani, P.O. Box, 126, Sudan.

Incidence and severity of cotton bacterial blight (BB) caused by *Xanthomonas capestris* pv *malvacearum* were evaluated in Rahad scheme in two field surveys conducted in season 2006/2007 and season 2011/2012. The study covered the southern, middle and northern parts of the ten blocks of the scheme. The experimental sites at Rahad research station Farm and Sudan China Technology Demonstration Centre (SCTDC) (Block 4) were included. All cotton cultivars were found to be susceptible to the disease under Rahad conditions at least for block 4. In the first survey, Disease incidence, and percent of infected leaves were, 100% and 71.7% respectively, while the disease severity was 2.3 and the percent of infected bolls was 8.0%. In the second survey the disease was only reported in block 4 with disease incidence of 52.3%, infected leaves of 25.7% , over all disease severity of 0.5% and 0.5% for infected bolls. The Rahad research station reported 97.8% for disease incidence, 56.9 % for infected leaves, 1.1% for over all disease severity and 13.7% for infected bolls. Concerning the introduced Chinese *Bt* cotton cultivars, BB incidence was 53.5 and 86.7%, Infected leaves were 16.7 and 22.2 % and overall disease severity of 0.2 and 0.4 for Hybrid and OPV *Bt* cultivars, respectively

Key words: Bacterial blight, cotton, *Xanthomonas capestris* pv *malvacearum,* Rahad scheme, Sudan.

Ps 76 Inhibition of *Meloidogyne javanica* Eggs hatching by Botanical Extract

Nigood M.Omer[1], Gamal A.A. Elbadri[2], and Adam M.A. Gadeseed[3]

[1] University of kordofan, faculty of Natural Resources and Environmental studies, plant protection department, ElObeid-Sudan.
[2] Agricultural Research Corporation, crop protection, Research center, P.O, Box, 126, Wadmadani –Sudan.
[3] University of Gezira , Faculty of Agricultural science, Phytopathology Researsh Center, Gezira-Sudan.

The inhibition effects of plant species extracts were evaluated on egg hatching of *Meloidogyne javanica*. *Meloidogyne javanica* eggs were exposed to 10000, 1000 and 100ppm of each extract for 24, 48 and 72hrs. All plant species leaf extracts inhibited egg hatching significantly compared to the control. The degree of inhibition was directly related to the concentration of the Extracts. The extracts from the seeds of *Azadirachta indica,*

Cassia occidentalis, *Cassia tora* and *Cucurbita moschata* at 10.000 ppm gave fewer numbers of hatched eggs (0.00-1.67%) at all exposure time compared to the control. On the other hand, seed extracts of *Ruellia patula, Boscia senegalensis, Lawsonia inermis and Aristolochia bracteolate*, leaves extracts of *Boscia senegalensis*, *Aristolochia bracteolate*, *Cassia occidentalis*, *Azadirachta indica* and *Guiera senegalensis* revealed variable degrees of inhibition and resulted in (4-24)% hatched eggs compared to untreated control.

Key words: plant species extracts, *Meloidogyne javanica,* seed extracts, leaves extracts