Journal of Agrometeorology 21 (1) : 114-118 (March 2019)

Short Communication

Biotic indicators as weather predictors in Wayanad district of Kerala

R. ANJU [1]* and BINOO P. BONNY[2]

[1]Academy of Climate Change Education and Research,

[2]Communication center, Kerala Agricultural University, Thrissur, 680 656, Kerala, India.

**Author for correspondences: Email: anjurp95@gmail.com*

Weather is certainly the most important factor determining the success or failure of agriculture. It forms the only factor over which farmers have no control. It directly influences the growth, development and yield of crops (Verma, 1998). Before the advent of modern methods of weather forecasting the rural communities used ITKs for weather prediction. The correct predictions are dependent upon the correct interpretation of indicators which is based on experience, skills and in sights of people and were applied to minimizing the risks rather than maximizing profits. Weather forecast describes the anticipated meteorological conditions for a specified place (or area) and period of time. Farmers are very astute weather watchers and they use different kinds of indigenous knowledge to predict weather. This knowledge is generally passed down from generation to generation by experimental learning and by word of mouth and is, for the most part, undocumented in written form. These local indicators and local knowledge systems cannot be replaced with scientific knowledge, as they are holistic and specific to local situations. They provide farmers with the ability to make decisions and plan in advance mostly making use of the local resources.

The study was conducted in Padinharethara, Vellamunda, Nenmeni and Mullankolly panchayats of Wayanad district of Kerala. Random sampling was followed to select 25 farmers from each of the four selected panchayats to make a total sample of 100 farmers. In addition, 20 key informants were selected purposively from the Department of Agriculture Development and Farmers Welfare, Non-Governmental Organizations working in the area viz. Wayanad district Adivasi Youvajana Samithy, Wayanad Social Service Society, M. S. Swaminathan Research Foundation, Malanad Charitable Society and Sulthanbathery Mannam Social Service Society, and Farmer Interest Organization viz. *Karshagasangams/ samathy* working with traditional farmers/ indigenous/ tribal groups. Exhaustive sampling was followed to include all the four blocks (Mananthavady, Kalpetta, Sulthanbathery and Panamaram) of the district for the study. Based on area under cultivation and crop damage reported under natural calamity during the past three years (2015, 2016, 2017), one panchayat each was selected from all the four blocks.

The survey of the study area was conducted in the month of December 2017- February, 2018 using standardized measurement instruments developed for the purpose. Identification and documentation of indigenous weather forecasting practices was done with the help of key informants from different parts of Wayanad. Personnel interview method using open-ended schedules were used to collect the data. In order to ensure the collection of meaningful information, participatory tools like Focus Group Discussions (FGD) were also used involving expert farmers/ key informants, and irrelevant and irrational practices were screened off. A list of 35 biotic weather forecasting practices were identified and documented for the study (Table 1,2,3).

Validation was operationalized as the process of checking the quality of recorded ITKs in terms of its logical and factual exactness. The ITKs were validated through farmer participatory process using Use validity score (UVS) developed for the purpose and also authentication using published research findings/ theories where ever possible. Use validity of a particular ITK was measured on three dimensions viz. purpose of use (PU), extent of use (EU) and perceived reliability (PR). Raw use validity score was calculated for each of the dimensions with the maximum possible score 12 and minimum possible score 3 (Fig.1). A score sheet was prepared using the above scoring pattern for each individual farmer. The use validity score (UVS) was developed as sum of product of each component score (PUscore, EUscore, PRscore) and their respective weightage (Wpu, Weu, Wpr).

UVS = (Wpu * PU score) +(Weu * EU score) + (Wpr * PR score) ..... (1)

Where,

DOI: 10.33307/entomon.v43i4.406
ENTOMON 43(4): 263-270 (2018)
Article No. ent. 43405

Treatment of coconut palm wood using inorganic preservatives

E.V. Anoop*, V. J. Jeeshma, T.K. Dhamodaran#, K. Vidyasagaran, Surabhi Lukose and Francis Scaria

College of Forestry, Kerala Agricultural University, Thrissur 680656, Kerala, India
#Kerala Forest Research Institute, Peechi, Kerala, India, Thrissur 680653, Kerala, India
Email:anoop.ev@kau.in

ABSTRACT: Freshly felled coconut wood is very much susceptible to wood boring insects, moulds and stain fungi as it has high levels of sugar, starch and moisture content throughout the trunk. The objective of this study was to develop appropriate preservative methods to protect sawn coconut palm wood from insects and other pathogens under the prevailing eco-climatic conditions in Kerala and to evaluate the effect of different preservative factors on the treatability of coconut wood. Wood samples were treated with inorganic chemicals like Copper Chrome Boron - CCB and Borax Boric Acid – BBA by diffusion and pressure treatment, of which pressure treatment performed better. Diffusion treatment of inorganic preservatives in high and medium density wood showed no significant difference in retention whereas significant difference was observed for penetration percentage. For pressure treatment, retention and penetration were significant in high density wood whereas medium density wood showed only significant retention. Solution concentrations and overall retention and penetration percentage were found to be significantly related. The study found that sawn coconut wood samples could be effectively treated with preservatives complying with the prescribed retention and penetration percentages as per the different standards and therefore, could be used as a potential substitute for conventional timbers and the insect damage was negligible. No incidence of insects, particularly termites and pin hole borers was observed during the graveyard studies.

KEY WORDS: Sawn coconut wood, diffusion, pressure treatment, preservatives, insects

INTRODUCTION

The coconut palm (*Cocos nucifera* L.) is found along the coastal and inlands regions of almost all tropical countries. The uses of coconut palms are almost limitless as it provides food, drink and shelter and raw material to a number of industries (Menon and Pandalai, 1958; Oduor and Githiomi, 2006; Djokoto, 2013). It is one of the world's most versatile and economically important palms (Moore, 1948; Subramanian, 2003). All the plant parts are used, on account of which, the palm has been regarded as *Kalapavriksham* or Tree of Life or Tree of heaven, a gift from nature to man (ENVIS, 2014). India is one of the largest producers of coconut which comprises 31 per cent of production and 17.6 per cent of the planted area (APCC, 2014). The bulk of country's plantation is concentrated in

* Author for correspondence

Indian Journal of Entomology, **81**(1): 130-133 (2019) Dol No.: 10.5958/0974-8172.2019.00018.X

RESISTANCE TO ACARICIDES IN *TETRANYCHUS TRUNCATUS* EHARA ON VEGETABLES

ANUSHREE BACHHAR, HASEENA BHASKAR*, BERIN PATHROSE* AND M. R. SHYLAJA

Department of Plant Biotechnology, CPBMB, College of Horticulture,
Kerala Agricultural University, Thrissur 680656
*Department of Agricultural Entomology, College of Horticulture,
Kerala Agricultural University, Thrissur 680656
*Email: bhaskarhaseena@yahoo.co.in

ABSTRACT

A study was undertaken at the College of Horticulture, Vellanikkara, KAU to investigate the status of acaricide resistance in *Tetranychus truncates* Ehara (Prostigmata: Tetranychidae), the predominant species of spider mite infesting vegetable crops of Thrissur district, Kerala. Susceptibility of three field strains of *T. truncatus* collected from okra (VkOk1), amaranthus (VkAm3) and pumpkin (VkPm3) to three commonly used acaricides, viz., spiromesifen 240 SC, fenazaquin 10EC and diafenthiuron 50WP was evaluated in the laboratory following leaf dip bioassay in comparison with a laboratory maintained susceptible strain (SS). Bioassay study revealed that the level of resistance varied among the strains for the acaricides evaluated. The strain VkOk1 recorded highest LC_{50} value and has developed 8 (1794.293 ppm), 13 (852.394 ppm) and 10 (1968.496 ppm) fold resistance to spiromesifen, fenazaquin and diafenthiuron, while VkAm3 recorded 7.0 (1571.021 ppm), and 5.53 (362.789 ppm) resistance to spiromesifen and fenazaquin, respectively. The strain VkPm3 showed susceptibility on par with the SS to all the acaricides evaluated. The study reports acaricide resistance in *T. truncatus* for the first time in India.

Key words: *Tetranychus truncatus*, okra, amaranthus, pumpkin, acaricides, resistance, spiromesifen, fenazaquin, diafenthiuron, LC_{50}, leaf dip bioassay

Spider mite has emerged as a serious pest of vegetable crops in Kerala (Binisha and Bhaskar, 2013) and *Tetranychus truncatus* is the predominant species infesting different vegetable crops of Thrissur district (Bennur et al., 2015). Novel acaricide molecules are in use in the vegetable tracts of Thrissur, but of late, several farmers have raised concern over the poor efficacy of these. Hence, it has become necessary to detect development of resistance to these acaricides in mite populations on vegetable crops of Thrissur district. High reproductive potential, short life cycle and arrhenotokous parthenogenesis facilitate rapid resistance development in spider mites to many pesticides compared with insects, often after only a few applications (Stumpf and Nauen, 2001; Ay and Gurkan, 2005). Development of resistance had been reported in spider mites to acaricides molecules after few years of use (Vassiliou and Kitsis, 2013). Recently, resistance to acaricides was reported in *Tetranychus urticae* from Punjab (Sharma and Bhullar, 2018). However, no work has been carried out in this line on *T. truncatus* in India. In this background a study was conducted on the level of acaricide resistance in *T. truncatus*, infesting vegetable crops in Thrissur district.

MATERIALS AND METHODS

Purposive sampling surveys on spider mites were conducted in the vegetable fields of College of Horticulture, Kerala Agricultural University campus and Krishi Vigyan Kendra, Vellanikkara, Thrissur district during April- December, 2017 and January, 2018. Spider mites associated with selected crops namely cowpea, ashgourd, brinjal, okra, pumpkin, amaranthus and cucumber were collected. Spider mite infested leaf samples were collected in polythene bag, labelled with details of locality, crop and date of collection, tied with rubber band and brought to the laboratory. In the laboratory, the mite infested leaves were observed under a stereozoom microscope and a single gravid female mite from an infested leaf was transferred to a fresh mulberry leaf using a fine camel hair brush. The mulberry leaf was then placed on wet sponge surrounded by water in a plastic tray. The population arising from each single gravid female was maintained as iso-line assigning unique accession number. These isolines were maintained as strains separately for mites collected from various crops, localities and dates surveyed.

Indian Journal of Entomology, **81**(1): 428-431 (2018) DOI No. 10.5958/0974-8172.2018.00067.6

EVALUATION OF *QUISQUALIS INDICA* AND *SAMADERA INDICA* GAERTN AS BOTANICAL PESTICIDES AGAINST *SPODOPTERA LITURA* (F.) IN POLYHOUSE

ANUSREE, S. S.*, NISHA, M. S. AND SHEELA, M. S.****

Department of Agricultural Entomology
College of Agriculture, Vellayani 695522, Thiruvananthapuram
***Department of Nematology*
**Email: anusreess777@gmail.com (corresponding author)*

ABSTRACT

The crude methanol and ethyl acetate extracts of *Quisqualis indica* L. and *Samadera indica* Gaetrn. were evaluated for their antifeedant and insecticidal action against third instar larvae of *Spodoptera litura* (F.) under laboratory condition. Maximum antifeedant activity was observed in crude methanol extracts of *S. indica* (45.62%) and *Q. indica* (31.87%) at 5% concentration. Significantly superior insecticidal action (93.51%) was noticed in *Q. indica* methanol extract 5%, while *S. indica* methanol extract 5% showed 73.55% larval mortality after three days of exposure. Results of pot culture study conducted under polyhouse revealed that crude methanolic extract of *Q. indica* and *S. indica* at 5% reduced the population to less than half with mean population of 3.2 and 3.8 larvae/plant two weeks after spraying. These reveal that these plants could be exploited as botanical pesticides in polyhouse.

Key words: *Quisqualis indica, Samadera indica,* methanolic and ethyl acetate extracts, antifeedant and insecticidal bioassay, pot culture, polyhouse

Protected cultivation of vegetables is getting popularized in India, and *Spodoptera litura* (F.) is a devastating pest of cowpea and salad cucumber grown under protected condition. The indiscriminative use of pesticides results in food contamination, environmental pollution and resistance buildup. Persistence of insecticides is more severe under polyhouse conditions resulting in residue problems. All these demand search for safer alternatives and botanical pesticides provide this.

Quisqualis indica L. (= *Combretum indicum* (L.) De Filipps), known as Rangoon creeper, is an evergreen creeping shrub with red flower clusters. It is used for treating various human ailments (Sahu *et al.,* 2012). *Samadera indica* Gaertn. (=*Quassia indica* (Gaertn.) Noot.) is an evergreen tree, belonging to family Simaroubaceae. The leaves of this tree possess many pharmacological properties including antimicrobial, antioxidant and anti-inflammatory activity (Viswanad *et al.*, 2011). Evaluation of the effect of these against insect pests are limited, and hence the present study on the potential of *Q. indica* and *S. indica*, as botanical pesticides against *S. litura* under polyhouse condition.

MATERIALS AND METHODS

Extraction of plant material: The fresh flowers of *Q. indica* were collected from in and around the Instructional Farm at College of Agriculture, Vellayani. The fresh mature leaves of *S. indica* were collected from the forest areas of Kulathuppuzha, Kollam district, Kerala. These were collected during morning hours from March-April 2015, and identification confirmed from the Department of Botany, Kerala University, Karyavattom, with the voucher specimens of *Q. indica* (KUBH- 6010) and *S. indica* (KUBH- 6011) deposited in the herbarium. These plant materials were shade dried at room temperature (28±2°C) and powdered coarsely. Each 18 g powder was soaked in 250 ml of ethyl acetate and methanol separately and stirred in a reciprocating shaker for 72 hr. Solutions obtained were filtered and evaporated to air dryness at room temperature and stored in refrigerator at 4°C till usage.

Collection and rearing of S. litura: The egg masses were collected from Instructional Farm, College of Agriculture, Vellayani, surface sterilized with 0.02% sodium hypochlorite, dried and allowed to hatch. After hatching the larvae were fed with tender castor leaves sterilized with 0.5% sodium hypochlorite until prepupal stage. Sterilized soil was provided for pupation at room temperature (28±2% RH) with 70±5% RH relative humidity in insectary. The moths emerged were transferred to oviposition chamber and maintained with

Indian Journal of Weed Science **50**(2): 124–128, 2018

Print ISSN 0253-8040 Online ISSN 0974-8164

Diversity of *Echinochloa* spp. in Palakkad rice tracts of Kerala

K.K. Aparna, Meera V. Menon*, Jiji Joseph and P. Prameela

College of Horticulture, Kerala Agricultural University, Thrissur, Kerala 680 656

**Email: m_vmenon@yahoo.com*

Article information

DOI: 10.5958/0974-8164.2018.00031.X

Type of article: Research article

Received : 28 January 2018
Revised : 14 May 2018
Accepted : 21 May 2018

Key words
Awns
Echinochloa colona
Echinochloa crus-galli
Rice

ABSTRACT

Surveys were conducted twice in the major rice tracts of Palakkad, once during January-February, and the other during August-September in 2016. Three major *Echinochloa* types were identified infesting rice fields, causing severe crop competition. The three types were *E. colona*, with awnless spikelets and two types of *E. crus-galli*, *viz. E. crus-galli* (type A) having short awns and *E. crus-galli* (type B) having long awns. Other than the length and arrangement of awns, there were no significant differences in the morphological characters of the latter two types. Frequency and relative frequency was the highest for *E. crus-galli* (type B). There was no specific association between the *Echinochloa* types and soil nutrient parameters, probably as there were no drastic differences in the chemical properties among the different locations. Cluster analysis classified *Echinochloa* types in to 5 groups at 66.67% similarity level. The study concludes that in a less productive environment, the awned types of *Echinochloa* could have a better chance of survival.

INTRODUCTION

The most important biological constraint to rice production is weed infestation. Effective weed management plays an important role in rice cultivation to prevent yield loss, reduce production cost and ensure grain quality. Weed infestation causes 9-51% yield reduction in rice crop (Mani *et al.* 1968). The yield reduction due to weed infestation and expense of weed management together contribute an estimated 15% loss in rice production (Smith 1981). *Echinochloa* species are one of the most destructive weeds associated with rice crop, distributed throughout the world especially in tropical and warm-temperate regions (Michael 2003, Shultana *et al.* 2013). Severe infestation of *Echinochloa* spp. has been reported in wet seeded rice in 15 countries, and in dry seeded rice in 22 countries and also in transplanted rice (Chauhan and Johnson 2009).The genus has more than 50 species, which includes the third and fourth most important weeds in the world, *viz. Echinochloa crus-galli* (L.) and *Echinochloa colona* (L.) (Holm *et al.* 1977, Michael 2003). Weeds belonging to *Echinochloa* species vary in their growth habit, distribution, and morphology (Barret and Wilson 1983). Being C_4 plants, *Echinochloa* are adapted to diverse environmental conditions. Their adaptations include the ability to flower in varying photoperiods and to produce numerous seeds, which are easily dispersed. The seedlings of *Echinochloa* closely resemble rice seedlings, and sometimes they are unintentionally transplanted to rice fields or might escape from hand weeding (Rao and Moody 1988). They are very strong competitors with rice and can cause drastic reduction in rice yield (Rao and Moody 1992).

India is one of the largest producers of rice in the world, having an area of 43.49 mha under rice cultivation with an annual production of 104 mt. Kerala is an Indian state located at the south western end of Indian peninsula at latitudes between 8°18' and 12°48' N longitudes between 74°52' and 77°22'E. The warm humid tropical climate and ample rainfall ensure the suitability of rice cultivation in the state. Palakkad, '*Kuttanad*', '*Pokkali*', '*Kole*' lands and 'Kaippad' are the main rice growing tracts of Kerala. Palakkad district, known as the granary of Kerala, has the largest acreage of rice cultivation in the state and contributes more than 45% of the total rice produced. Recently, some new types and unidentified species of *Echinochloa* have been seen to occur in the rice fields of Kerala, especially in Palakkad district. These are believed to have been brought to the area through contaminated seeds and through mechanical harvesters, which were previously used in other states, or may be due to introgression of the existing *Echinochloa* types. Variation in genetic and

Journal of Tropical Agriculture 55 (1): 91-95, 2017

Short communication

Efficacy of pre and post emergence herbicides on *Echinochloa* spp.

K.K.Aparna, Meera V. Menon* and P. Prameela

College of Horticulture, KAU P.O., Kerala Agricultural University, Thrissur 680656, Kerala, India.

Received 12 June 2017; received in revised form 16 June 2017; accepted 30 June 2017

Abstract

A pot culture experiment was conducted to evaluate the efficacy and determine the most suitable time of application of pre and post emergence herbicides on types of *Echinochloa* dominating in the rice fields of Palakkad, Kuttanadu and Kole lands during February to May 2017. *Echinochloa colona*, two types of *Echinochloa crus-galli* (type A & B) and *Echinochloa stagnina* were the four identified types. The pre emergence herbicide treatments included pretilachlor @ 0.75 kg a.i. ha^{-1}, oxyfluorfen @ 0. 15 kg a.i. ha^{-1}, pyrazosulfuron ethyl @ 1.25 kg a.i. ha^{-1}, pendimethalin @1.5 kg a.i. ha^{-1}, pretilachlor + bensulfuron methyl @ (0.06+ 0.6) kg a.i. $ha^{-1}$and oxadiargyl @ 0.10 kg a.i. ha^{-1}. All the herbicides were applied in both puddle sown and dry sown condition. Post emergence treatments were applied at four leaf and eight leaf stages of *Echinochloa* spp. and the treatments included cyhalofop butyl @ 0.08 kg a.i. ha^{-1}, bispyribac sodium @ 0.025 kg a.i. ha^{-1}, penoxsulam @ 0.025 kg a.i. ha^{-1}, fenoxaprop–p–ethyl @ 0.06 kg a.i. ha^{-1}, ethoxysulfuron @ 0.015 kg a.i. ha^{-1} and metamifop @ 0. 125 kg a.i. ha^{-1}. Among the pre emergence herbicides, all except pyrazosulfuron ethyl were completely effective against all the four types of *Echinochloa*. Bispyribac sodium and metamifop were effective against *E. colona* at both four leaf and eight leaf stages, whereas penoxsulam was effective only at four leaf stage. Bispyribac sodium was highly effective against *E. crus-galli* (type A) at eight leaf stage. *Echinochloa crus-galli* (type B) was effectively controlled by metamifop when sprayed at four leaf stage, and penoxsulam at eight leaf stage. *E. stagnina* was tolerant to all the herbicides tried. However, cyhalofop butyl and fenoxaprop-p-ethyl although effective at the four leaf stage in reducing the survival percentage, resulted in highly persistent survivors.

Keywords: *Echinochloa colona, Echinochloa crus-galli, Echinochloa stagnina,* Post emergence herbicides, Pre emergence herbicides

Echinochloa species are one of the most devastating serious weeds associated with rice crop (Shultana et al., 2013). The genus contains more than 50 species distributed throughout the world primarily in tropical and warm temperate regions (Michael, 2003). *Echinochloa* infestation is a serious problem in the rice tracts of Kerala including Palakkad, Kuttanadu and Kole lands. Recently some new morphotypes and species of *Echinochloa* are seen to occur in these rice tracts and farmers report that the plants were less sensitive to commonly used herbicides. Effective control of *Echinochloa* spp. relies on the selection of the appropriate herbicide, the optimum rate of application and the correct time of application, along with rotation of herbicides. So, a survey was conducted in 2016 in the rice tracts of Palakkad, Kuttanadu (Moncombu) and Kole lands (Alappad Kole) to identify the dominant *Echinochloa* species. From the survey, three major *Echinochloa* types; severely infesting rice fields and leading to crop-weed competition were identified from Palakkad. The three types included *E. colona* and two types of *E. crus-galli*, one with short awns designated as *Echinochloa crus-galli* (type A) and the other with longer awns named *E. crus-galli* (type B). *Echinochloa stagnina* was the dominant weed in the rice tracts of Kuttanadu and Kole lands. In this study, the efficacy of commonly used herbicides

*Author for correspondences: Phone: 91-9447992403, Email: m_vmenon@yahoo.com

Int.J.Curr.Microbiol.App.Sci (2018) 7(3): 2990-2999

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 7 Number 03 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.703.346

Effect of Biofumigation with Plant Extracts on Mycelial Growth and Sclerotial Germination of *Rhizoctonia solani* Causing Collar Rot and Web Blight of Cowpea

K.P. Aparna* and V.K. Girija

Department of Plant Pathology, College of Agriculture, Vellayani, Thiruvananthapuram, India

**Corresponding author*

Keywords

Rhizoctonia solani, Biofumigation, Antifungal nature, Mycelial regeneration from sclerotia

Article Info

Accepted:
24 February 2018
Available Online:
10 March 2018

A B S T R A C T

Plants synthesize secondary metabolites and some of them as well as their derivatives have antimicrobial activity such as alkaloids, flavonoids, isoflavonoids, tannins, coumarins, glucosides, terpenes and phenolic compounds. An attempt was made to evaluate the *in vitro* antifungal and biofumigant nature of ten different plants on suppression of mycelial growth of *R. solani*. Among these plant extracts at a concentration of 12.5%, total inhibition of the pathogen was obtained on PDA incorporated with leaf extracts of cabbage and garlic creeper. The extracts of leaves of sweet potato (37.44%) and radish (30.00%) also gave significant suppression. Under *in vitro* evaluation of the biofumigant nature of plants, complete suppression of the pathogen was obtained on treatment with cabbage, cassava, garlic creeper and mustard. This was followed by radish, moringa, neem and lemon grass which gave suppression of 87.80%, 83.30%, 77.80% and 76.67%, respectively. Among the plants, cabbage, garlic creeper and mustard were found to be very effective biofumigants and caused 100% suppression on mycelial regeneration from sclerotia 24 h after exposure to the treatment. After a period of two weeks of biofumigation with cassava 100% suppression on sclerotial growth was noticed. Biofumigation with leaves of other plants such as sweet potato, moringa, papaya, neem and lemongrass, which are widely grown in the state afforded suppression of 81.85, 81.11, 79.63, 77.04 and 76.67%, respectively one month after exposure to the treatment. In general, biofumigation with plants exerted suppression of mycelial regeneration from sclerotia. The extent of suppression was found to increase with increase in period of incubation with biofumigants.

Introduction

Cowpea [*Vigna unguiculata* (L.) Walp] is remunerative crop grown for its immature pods used as vegetable. Cowpea is susceptible to an array of pathogens which can result in substantial loss in yield. Among the fungal diseases collar rot caused by *Rhizoctonia solani* is a major concern. *R. solani* survives in soil as sclerotia which are compressed mycelia that enable it to persist in soil for long periods in the absence of host plant (Upamanyu *et al.*, 2002). The primary spread of infection starts from sclerotia. The perfect stage of the

Int.J.Curr.Microbiol.App.Sci (2018) 7(1): 2091-2098

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 7 Number 01 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.701.252

Efficacy of Plant Oils and Oil Cakes against *Rhizoctonia solani* Kuhn Causing Collar Rot and Web Blight of Cowpea under *in vitro* Conditions

K.P. Aparna* and V.K. Girija

Department of Plant Pathology, College of Agriculture, Kerala Agricultural University, Thiruvananthapuram-695 522, Kerala, India

**Corresponding author*

Keywords

Antifungal, Bio-fumigant, Plant oils, Oilcakes, *Rhizoctonia solani*

Article Info

Accepted:
16 December 2017
Available Online:
10 January 2018

A B S T R A C T

An attempt was made to evaluate the *in vitro* antifungal and bio-fumigant nature of four plant oils and oil cakes on suppression of mycelial growth of *R. solani*, the incitant of collar rot and web blight of cowpea. The plant oils *viz.*, neem oil, lemongrass oil, mahua oil and tea tree oil at 5% concentration and the oilcakes such as groundnut oil cake (source: *Arachis hypogaea* (Linn.), neem cake (source: *Azadirachta indica* A. Juss.), mahua cake (source: *Madhuca longifolia*) and mustard oil cake (source: *Brassica juncea* L.) at 10% concentration were evaluated for their antifungal action by poisoned food technique and highest inhibition (100%) was obtained on incorporation of lemongrass oil, tea tree oil and mustard oil cake into the PDA medium. This was followed by groundnut oil cake and neem cake with a suppression of 79.62% and 76.29%, respectively. In the experiment to evaluate the bio-fumigant nature of tested plant oils and oilcakes, 100% suppression was noticed with lemongrass oil, tea tree oil and mustard oil cake and were statistically superior to all other treatments. Biofumigation with ground nut cake and neem cake also recorded lower values of 5.56% and 3.00%, respectively.

Introduction

Cowpea [*Vignaunguiculata* (L.) Walp], an important leguminous crop of Kerala, is cultivated in the uplands and in rice fallows. The fresh pods are consumed as vegetable while the dried seeds are also utilized in cooking. All the above ground parts provide a good source of animal fodder. The semi-erect bush cowpea spread over the ground as a mulch and provide a protective cover from soil erosion and also suppress weed growth. Soil fertility restoring capacity makes it an essential component of almost all cropping systems. The cultivation of the crop is affected by collar rot and web blight caused by *Rhizoctonia solani* Kuhn in all its growth stages which results in severe crop and yield loss (Lakshmanan *et al.,* 1979). Under congenial climatic conditions, collar rot symptom of the disease is more prevalent than web blight symptoms. It is often difficult to control ubiquitous soil and root-inhabiting pathogens like *R. solani* that survive saprophytically in soil organic matter and exist for long periods in the absence of a host plant in the form of sclerotia, except with the elaborate and repeated use of fungicides

Indian Journal of Weed Science **50**(2): 124–128, 2018

Print ISSN 0253-8040 Online ISSN 0974-8164

Diversity of *Echinochloa* spp. in Palakkad rice tracts of Kerala

K.K. Aparna, Meera V. Menon*, Jiji Joseph and P. Prameela

College of Horticulture, Kerala Agricultural University, Thrissur, Kerala 680 656

**Email: m_vmenon@yahoo.com*

Article information

DOI: 10.5958/0974-8164.2018.00031.X

Type of article: Research article

Received : 28 January 2018
Revised : 14 May 2018
Accepted : 21 May 2018

Key words
Awns
Echinochloa colona
Echinochloa crus-galli
Rice

ABSTRACT

Surveys were conducted twice in the major rice tracts of Palakkad, once during January-February, and the other during August-September in 2016. Three major *Echinochloa* types were identified infesting rice fields, causing severe crop competition. The three types were *E. colona*, with awnless spikelets and two types of *E. crus-galli*, *viz. E. crus-galli* (type A) having short awns and *E. crus-galli* (type B) having long awns. Other than the length and arrangement of awns, there were no significant differences in the morphological characters of the latter two types. Frequency and relative frequency was the highest for *E. crus-galli* (type B). There was no specific association between the *Echinochloa* types and soil nutrient parameters, probably as there were no drastic differences in the chemical properties among the different locations. Cluster analysis classified *Echinochloa* types in to 5 groups at 66.67% similarity level. The study concludes that in a less productive environment, the awned types of *Echinochloa* could have a better chance of survival.

INTRODUCTION

The most important biological constraint to rice production is weed infestation. Effective weed management plays an important role in rice cultivation to prevent yield loss, reduce production cost and ensure grain quality. Weed infestation causes 9-51% yield reduction in rice crop (Mani *et al.* 1968). The yield reduction due to weed infestation and expense of weed management together contribute an estimated 15% loss in rice production (Smith 1981). *Echinochloa* species are one of the most destructive weeds associated with rice crop, distributed throughout the world especially in tropical and warm-temperate regions (Michael 2003, Shultana *et al.* 2013). Severe infestation of *Echinochloa* spp. has been reported in wet seeded rice in 15 countries, and in dry seeded rice in 22 countries and also in transplanted rice (Chauhan and Johnson 2009).The genus has more than 50 species, which includes the third and fourth most important weeds in the world, *viz. Echinochloa crus-galli* (L.) and *Echinochloa colona* (L.) (Holm *et al.* 1977, Michael 2003). Weeds belonging to *Echinochloa* species vary in their growth habit, distribution, and morphology (Barret and Wilson 1983). Being C_4 plants, *Echinochloa* are adapted to diverse environmental conditions. Their adaptations include the ability to flower in varying photoperiods and to produce numerous seeds, which are easily dispersed. The seedlings of *Echinochloa* closely resemble rice seedlings, and sometimes they are unintentionally transplanted to rice fields or might escape from hand weeding (Rao and Moody 1988). They are very strong competitors with rice and can cause drastic reduction in rice yield (Rao and Moody 1992).

India is one of the largest producers of rice in the world, having an area of 43.49 mha under rice cultivation with an annual production of 104 mt. Kerala is an Indian state located at the south western end of Indian peninsula at latitudes between 8°18' and 12°48' N longitudes between 74°52' and 77°22'E. The warm humid tropical climate and ample rainfall ensure the suitability of rice cultivation in the state. Palakkad, '*Kuttanad*', '*Pokkali*', '*Kole*' lands and 'Kaippad' are the main rice growing tracts of Kerala. Palakkad district, known as the granary of Kerala, has the largest acreage of rice cultivation in the state and contributes more than 45% of the total rice produced. Recently, some new types and unidentified species of *Echinochloa* have been seen to occur in the rice fields of Kerala, especially in Palakkad district. These are believed to have been brought to the area through contaminated seeds and through mechanical harvesters, which were previously used in other states, or may be due to introgression of the existing *Echinochloa* types. Variation in genetic and

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci

Comparative assessment of heat stress induced changes in carcass traits, plasma leptin profile and skeletal muscle myostatin and HSP70 gene expression patterns between indigenous Osmanabadi and Salem Black goat breeds

P.R. Archana[a,b,c], V. Sejian[a,*], Wilfred Ruban[d], M. Bagath[a], G. Krishnan[a], J. Aleena[a,b,c], G.B. Manjunathareddy[e], V. Beena[c], Raghavendra Bhatta[a]

[a] ICAR, National Institute of Animal Nutrition and Physiology, Adugodi, Bangalore 560030, India
[b] Academy of Climate Change Education and Research, Kerala Agricultural University, Vellanikkara, Thrissur, Kerala, India
[c] Centre for Animal Adaptation to Environment and Climate Change Studies, Kerala Veterinary and Animal Sciences University, Mannuthy, Thrissur, Kerala, India
[d] Department of Livestock Product Technology, Hebbal Veterinary College, Karnataka Veterinary Animal and Fishery Sciences University, Hebbal, Bangalore, India
[e] ICAR, National Institute of Veterinary Epidemiology and Disease Informatics, Bangalore, India

ARTICLE INFO

Keywords:
Carcass
Heat stress
HSP70
Myostatin
Osmanabadi goat
Salem Black goat

ABSTRACT

The primary objective of the study was to compare the impact of heat stress on meat production characteristics of Osmanabadi and Salem Black breed goats based on changes in carcass characteristics, meat quality attributes, plasma leptin concentration, skeletal muscle myostatin and heat shock protein 70 (HSP70) gene expression patterns. The goats were randomly distributed into four groups: OSC (n = 6; Osmanabadi Control), OSHS (n = 6; Osmanabadi Heat Stress), SBC (n = 6; Salem Black Control) and SBHS (n = 6; Salem Black Heat Stress). The animals were slaughtered at the end of the study and their meat characteristics were assessed. This study established the impact of heat stress on a wide variety of carcass and meat quality characteristics in OS and SB goat breeds. The results from the study also provided some crucial evidence for a better resilience capacity of Salem Black breed as compared to Osmanabadi goats in maintaining the meat production during heat stress. The study also established plasma leptin and HSP70 genes to be the ideal biomarkers to reflect the impact of heat stress on meat characteristics in indigenous goats.

1. Introduction

Developing countries constitute substantial small ruminant population and they are considered the major source of the rural economy in these countries (Agarwal, Karim, Kumar, Sahoo, & John, 2014). Small ruminants, especially goats effectively utilize feed, needs low initial investment, require less space for housing, are easy to manage and labour demand is also less (Maitra et al., 2014). Therefore, the contribution of goat production to the livelihood of poor and marginal farmers, especially in developing countries, is well recognized (Maitra et al., 2014; Shilja et al., 2016).

Goats are important from the current climate change perspective compared to other livestock species due to its superior capability to survive in any agro-ecological zone because of their small size, skilful grazing behaviour, higher disease resistance, drought tolerance, and high feed conversion efficiency (Debele et al., 2013; Shilja et al., 2016). In a tropical country like India, goats can effectively tackle the feed scarcity and water shortage arising as a result of climatic extremes. Furthermore, the extent of their contribution in meeting the food demands of the rural poor is often underestimated. Goats are also considered to be the most suitable species from the climate change perspectives for ensuring the livelihood security of the poor and marginal farmers.

The livestock meat and carcass quality characteristics are governed by several intrinsic and extrinsic factors. The intrinsic factors that affect the meat quality in ruminants include species, breed, age, weight at slaughter and gender (male, female, castrated). Similarly, the extrinsic factors affecting the meat quality include stress (environmental effect, transportation and handling), diet and weaning (Guerrero, Velandia Valero, Campo, & Sañudo, 2013). Among the environmental factors, heat stress was identified as the major pre-disposing factor in negatively affecting the livestock meat production (Nardone, Ronchi, Lacetera,

* Corresponding author at: Animal Physiology Division, National Institute of Animal Nutrition and Physiology, Adugodi, Bangalore 560030, India.
E-mail address: drsejian@gmail.com (V. Sejian).

https://doi.org/10.1016/j.meatsci.2018.03.015
Received 7 October 2017; Received in revised form 19 March 2018; Accepted 21 March 2018

Journal of Tropical Agriculture 56 (1): 1-8, 2018

Enzyme dynamics and organic carbon status of soil as influenced by flucetosulfuron in wet seeded rice

S. R. Arya*, Elizabeth K. Syriac and B. Aparna

College of Agriculture, Vellayani, Thiruvananthapuram 695 522, Kerala, India.

Received 11 January 2018; received in revised form 06 February 2018 ; accepted 04 June 2018

Abstract

A study was under taken during the *Kharif* and *Rabi* seasons of 2016-'17 in Kalliyoor Panchayat, Nemom block, Thiruvananthapuram district, Kerala, India (8.4455^0 N and 76.9918^0 E) to assess the effect of the herbicide flucetosulfuron on soil enzymes viz., dehydrogenase, acid phosphatase, and urease and organic carbon content of soil under wet seeded system of rice cultivation. The experiment was laid out in Randomised Block Design (RBD) with 12 treatments replicated thrice. Flucetosulfuron @ 20, 25 and 30 g ha^{-1} applied at 2-3, 10-12 and 18-20 days after sowing (DAS) along with two control treatments viz., hand weeding at 20 and 40 DAS and unweeded control comprised the treatments. In the case of dehydrogenase enzyme activity and organic carbon content, at 15 and 30 days after herbicide application, during both the seasons, the dose 25 g ha^{-1} was found to be the best when applied at 10-12 and 18-20 DAS compared to 2-3 DAS. Significant and positive correlation was noticed between dehydrogenase enzyme and organic carbon content of the soil. Acid phosphatase enzyme activity was found to be non-significant at 15 and 30 days after herbicide application, during both the seasons. It was also observed that herbicide application could increase the urease enzyme activity irrespective of dose and time of application, in both the seasons. Overall, the results revealed that none of the major enzymes were harmfully influenced by the sulfonyl urea herbicide, flucetosulfuron at the tested doses and time of application.

Keywords: Acid phosphatase, Dehydrogenase, Flucetosulfuron, Soil enzymes, Soil health, Urease

Introduction

In direct seeded rice (DSR), simultaneous emergence of rice seedlings and weeds causes severe crop-weed competition, resulting in 15- 20 per cent yield loss on an average (Hasanuzzaman et al., 2009), and in severe cases may exceed 50 per cent (Jayadeva et al., 2011). In large scale rice farming, herbicide based weed management has become the smartest and most viable option due to scarcity and high labour wage rate (Singh et al., 2006; Anwar et al., 2012). Among herbicides, use of low dose, high efficacy herbicides (LDHE) is becoming more popular due to its high efficacy and environmental safety. Flucetosulfuron is one of the latest additions to this array, and it is a broad spectrum, systemic herbicide, inhibiting acetolactase synthase (ALS) enzyme, thus causing chlorosis of the plant, leading to death of apical meristems (Paranjape et al., 2014).

There is an increasing concern that herbicides not only affect target organisms (weeds) but also the microbial communities present in the soils, and these non-target effects may reduce the performance of important soil functions (Sebiomo et al., 2011). Soil microbial and earthworm population, soil enzyme activity and organic carbon content in soil are considered as the bio-indicators of soil health because of their active role in soil organic matter production, decomposition of xenobiotics and cycling of nutrients, ease of measurement and rapid response

*Author for correspondences: Phone: 91-9400555215, Email: aaryanarayan@gmail.com

Journal of Crop and Weed, 14(1): 212-219 (2018)

Bioassay for detecting flucetosulfuron residue in wetland rice soils

S. R. ARYA, E. K. SYRIAC AND [1]S. K. RAJ

Department of Agronomy, College of Agriculture, Vellayani, Thiruvananthapuram – 695 522, India
[1]Coconut Research Station, Balaramapuram, Thiruvananthapuram – 695 501, India

Received : 02-07-2017 ; Revised : 03-03-2018 ; Accepted : 05-03-2018

ABSTRACT

In order to assess the residue of flucetosulfuron in wetland rice soils, bioassay was conducted in two parts viz., identification of suitable indicator plants for flucetosulfuron and assessment of herbicide residue in post experiment soil using selected indicator plant. To identify indicator plant for flucetosulfuron, pot culture experiments were conducted using four test plants viz.,barnyard millet, cucumber, sunflower and maize. Each plant species was allowed to grow in 8 different concentrations of flucetosulfuron viz., 0, 0.01, 0.05, 0.1, 0.5, 1, 10, 50 and 100 µL L^{-1}. The effect of different concentrations of flucetosulfuron on germination percentage, shoot length, root length, shoot fresh and dry weight of each indicator plant species were recorded. Based on statistical analysis, sunflower was selected as the most sensitive indicator plant for assessing the residual effect of flucetosulfuron, since it recorded the highest regression co-efficient for the parameters tested. Among the various parameters compared, shoot length of sunflower was selected as the most suitable parameter to detect the residue of flucetosulfuron in soil. Logarithmic linear regression equation developed for shoot length of sunflower was Y=4.309788-0.64968 ln (X), R^2= 0.946. Field experiments were carried out with 3 different concentrations (20, 25 and 30 g ha^{-1}) of flucetosulfuron at 3 different times of application (2-3, 10-12 and 18-20 days after sowing) for the Kharif and Rabi seasons of 2016-'17. After each filed experiment, bioassay was conducted in post experiment soil and results revealed that there is no toxic residue of flucetosulfuron in the soil of the experimental plots indicating the safety of the chemical.

Keywords: Bioassay, flucetosulfuron, herbicide residue assessment, indicator plants, sunflower, wet seeded rice

Weeds are the most harmful group of pests and one of the major constraints which affect rice productivity (Bhimwal and Pandey, 2014) adversely if not managed during critical period of crop growth. To bring weeds under control without affecting the yield, adoption of weed management practices at critical periods of crop growth is a necessary. Even though hand weeding is the best method, herbicide based weed management is the smartest and viable option due to scarcity and high wages of labour (Anwar *et al*., 2012). Despite some undesirable side effects, no viable alternative is presently available to shift the chemical dependence for weed management in rice (Juraimi *et al*., 2013). Sulfonyl urea group of herbicides are low dose high efficacy herbicides having acetolactase synthase (ALS) inhibition as mode of action in plants, and are safe for mammals. Flucetosulfuron is such a new generation, pyrimidinyl sulfonylurea, broad spectrum herbicide, odourless white solid, soluble in water, acetone, ethyl alcohol, ethyl acetate, n-hexane and methanol.Even though new generation herbicides are required in smaller quantities, their persistence and safety to the succeeding crop in the herbicide applied field must be analysed thoroughly. The phytotoxic activity of the herbicide molecule can be measured by bioassay method which is cost-effective and do not require expensive equipments like High Performance Liquid Chromatograph (HPLC). Bioassays or biological tests applied to the study of herbicides, are based on the response of different species, chosen as controls, to the application of the herbicide under study (Horowitz, 1976).Bioassay is the simplest and direct method of residue assessment. It possesses several advantages over mechanical or chemical methods of residue assessment like determination of both active or biologically active substance and possible degradation products of the herbicide; being based on the observation of the response of the plants to herbicide, it provides more practical information and materials involved and the methodology is simple with high reproducibility (Günther *et al*., 1993).

Bioassays are usually conducted with sensitive plant species, also called as indicator plants or test species. A plant that can be used as an indicator species must be sensitive enough to detect even very small amounts of herbicide in the soil or another substrate. It must also show a gradual increase in susceptibility with increasing herbicide concentrations. The indicator plant should be vigorous and grow rapidly under the conditions of bioassay. The more commonly used indicator species are cucumber, oats, barnyard grass, sunflower, tomato, barley, sorghum, crab grass (*Cenchrus sanguinalis*), yellow foxtail (*Setaria glauca*) *etc*. The ideal test species must however be determined from preliminary experiments with the herbicides under study (Rao, 2000).

Email: aaryanarayana@gmail.com

ANSF
APPLIED AND NATURAL SCIENCE FOUNDATION

Journal of Applied and Natural Science
10 (3): 853 - 859 (2018)
ISSN : 0974-9411 (Print), 2231-5209 (Online)
journals.ansfoundation.org

Impact of flucetosulfuron on weed seed bank in wet seeded rice

S. R. Arya*
Department of Agronomy, College of Agriculture, Vellayani, Thiruvananthapuram-695522 (Kerala), India
Elizabeth K. Syriac
Department of Agronomy, College of Agriculture, Vellayani, Thiruvananthapuram-695522 (Kerala), India

*Corresponding author. E-mail: aaryanarayan@gmail.com

Article Info
DOI:10.31018/jans.v10i3.1727
Received: May 12, 2018
Revised: June 28, 2018
Accepted: July 5, 2018

How to Cite
Arya, S.R. and Syriac, E.K. (2018). Impact of flucetosulfuron on Weed seed bank in Wet seeded rice. *Journal of Applied and Natural Science*, 10(3): 853 - 859

Abstract
An experiment was conducted to assess the impact of flucetosulfuron, a new generation sulfonylurea herbicide, on weed seed bank dynamics of wet land paddy field. Field experiments were carried out during two consecutive seasons (*Kharif* 2016 and *Rabi* 2016-'17), to assess the bio-efficacy of flucetosulfuron in wet seeded rice which was accompanied by weed seed bank assay. Weed seed bank assay of the soil was carried out before and after the field experiments in both the seasons by the seedling emergence method. The experiment on weed seed bank was laid out in Completely Randomised Block Design (CRD) with 12 treatments replicated thrice. Flucetosulfuron @ 20, 25, and 30 g ha^{-1} applied at 2-3, 10-12, and 18-20 days after sowing (DAS) along with two control treatments *viz.*, hand weeding at 20 and 40 DAS and unweeded control comprised the treatments. The emerging weeds were uprooted at 14 days interval up to a period of two months; categorized as grasses, broad leaved weeds, and sedges and counted. Results revealed that non-herbicidal plots recorded significantly higher count of total emerged weeds compared to herbicide applied plots. In all the herbicide applied plots, effective reduction in weed seed bank could be obtained irrespective of the dose of the herbicide. Regarding the time of application, flucetosulfuron applied at 10-12 and 18-20 DAS recorded significantly lower weed seed bank during both the seasons, compared to its application at 2-3 DAS.

Keywords: Broad leaved weeds, Flucetosulfuron, Grasses, Sedges, Weed Management, Weed Seed Bank

INTRODUCTION

The weed seed bank can be defined as the reserve of viable weed seeds present in the soil surface and are scattered throughout the soil profile (Singh *et al.*, 2012). Weed seed bank consists of both recently shed new weed seeds and older seeds that have persisted in the soil from previous years (Menalled, 2013). According to Hossain and Begum (2015), soil seed bank is an important component of the life cycle of weeds. The soil weed seed bank is a dynamic system consisting of inputs and outputs. The inputs occur through seed rain as an outcome of effective dispersal mechanisms (wind, water, animals and human interventions) and the outputs using sprouting, predation (Chauhan *et al.*, 2010) and seed decay or death (Mohler *et al.*, 2012). In the rice field, many weed species occur which can produce enormous number of small seeds and vegetative propagules as an approach to subsist the pressures imposed by weed control methods (Munhoz and Felfli, 2006). Such seeds may remain on the soil surface or get buried after dispersal using biotic and abiotic agents, thus forming a potential seed bank which becomes the main source of weeds in rice cropping fields (Mesquita, 2017).

Weed seedbanks are the main source of weed infestation in crops, and seed bank dynamics regulate the communities of many of the most important weed species (Barberi and Lo Cascio, 2001). In rice fields, the size of the weed seedbank is highly flexible depending on the climate, relief position, soil moisture content, depth of sampling, cropping history of the areas, and management practices used by farmers (Mesquita, 2017). The size and configuration of weed seed banks and weed populaces can be reformed by the use of herbicides, planting methods, and the use of rice cultivars which are being commonly used by the farmers (Bhagat *et al.* 1999). According to Hossain and Begum (2015), herbicides, crop rotation, tillage, and mulching are the factors affecting size of weed seed bank.

Seed banks perform the role of solitary source of future weed populations of the both annual and

Journal of Crop and Weed, 14(1): 212-219 (2018)

Bioassay for detecting flucetosulfuron residue in wetland rice soils

S. R. ARYA, E. K. SYRIAC AND [1]S. K. RAJ

Department of Agronomy, College of Agriculture, Vellayani, Thiruvananthapuram – 695 522, India
[1]Coconut Research Station, Balaramapuram, Thiruvananthapuram – 695 501, India

Received : 02-07-2017 ; Revised : 03-03-2018 ; Accepted : 05-03-2018

ABSTRACT

In order to assess the residue of flucetosulfuron in wetland rice soils, bioassay was conducted in two parts viz., identification of suitable indicator plants for flucetosulfuron and assessment of herbicide residue in post experiment soil using selected indicator plant. To identify indicator plant for flucetosulfuron, pot culture experiments were conducted using four test plants viz.,barnyard millet, cucumber, sunflower and maize. Each plant species was allowed to grow in 8 different concentrations of flucetosulfuron viz., 0, 0.01, 0.05, 0.1, 0.5, 1, 10, 50 and 100 µL L^{-1}. The effect of different concentrations of flucetosulfuron on germination percentage, shoot length, root length, shoot fresh and dry weight of each indicator plant species were recorded. Based on statistical analysis, sunflower was selected as the most sensitive indicator plant for assessing the residual effect of flucetosulfuron, since it recorded the highest regression co-efficient for the parameters tested. Among the various parameters compared, shoot length of sunflower was selected as the most suitable parameter to detect the residue of flucetosulfuron in soil. Logarithmic linear regression equation developed for shoot length of sunflower was Y=4.309788-0.64968 ln (X), R^2= 0.946. Field experiments were carried out with 3 different concentrations (20, 25 and 30 g ha^{-1}) of flucetosulfuron at 3 different times of application (2-3, 10-12 and 18-20 days after sowing) for the Kharif and Rabi seasons of 2016-'17. After each filed experiment, bioassay was conducted in post experiment soil and results revealed that there is no toxic residue of flucetosulfuron in the soil of the experimental plots indicating the safety of the chemical.

Keywords: Bioassay, flucetosulfuron, herbicide residue assessment, indicator plants, sunflower, wet seeded rice

Weeds are the most harmful group of pests and one of the major constraints which affect rice productivity (Bhimwal and Pandey, 2014) adversely if not managed during critical period of crop growth. To bring weeds under control without affecting the yield, adoption of weed management practices at critical periods of crop growth is a necessary. Even though hand weeding is the best method, herbicide based weed management is the smartest and viable option due to scarcity and high wages of labour (Anwar *et al*., 2012). Despite some undesirable side effects, no viable alternative is presently available to shift the chemical dependence for weed management in rice (Juraimi *et al*., 2013). Sulfonyl urea group of herbicides are low dose high efficacy herbicides having acetolactase synthase (ALS) inhibition as mode of action in plants, and are safe for mammals. Flucetosulfuron is such a new generation, pyrimidinyl sulfonylurea, broad spectrum herbicide, odourless white solid, soluble in water, acetone, ethyl alcohol, ethyl acetate, n-hexane and methanol.Even though new generation herbicides are required in smaller quantities, their persistence and safety to the succeeding crop in the herbicide applied field must be analysed thoroughly. The phytotoxic activity of the herbicide molecule can be measured by bioassay method which is cost-effective and do not require expensive equipments like High Performance Liquid Chromatograph (HPLC). Bioassays or biological tests applied to the study of herbicides, are based on the response of different species, chosen as controls, to the application of the herbicide under study (Horowitz, 1976).Bioassay is the simplest and direct method of residue assessment. It possesses several advantages over mechanical or chemical methods of residue assessment like determination of both active or biologically active substance and possible degradation products of the herbicide; being based on the observation of the response of the plants to herbicide, it provides more practical information and materials involved and the methodology is simple with high reproducibility (Günther *et al*., 1993).

Bioassays are usually conducted with sensitive plant species, also called as indicator plants or test species. A plant that can be used as an indicator species must be sensitive enough to detect even very small amounts of herbicide in the soil or another substrate. It must also show a gradual increase in susceptibility with increasing herbicide concentrations. The indicator plant should be vigorous and grow rapidly under the conditions of bioassay. The more commonly used indicator species are cucumber, oats, barnyard grass, sunflower, tomato, barley, sorghum, crab grass (*Cenchrus sanguinalis*), yellow foxtail (*Setaria glauca*) *etc*. The ideal test species must however be determined from preliminary experiments with the herbicides under study (Rao, 2000).

Email: aaryanarayana@gmail.com

Journal of Tropical Agriculture 56 (2): 176-178, 2018

Short Communication

Standardisation of grafting techniques in African marigold (*Tagetes erecta* L.)

Athira Baburaj, U. Sreelatha*, T.V. Anupama and C. Narayanankutty

College of Horticulture, Kerala Agricultural University, Vellanikkara, Thrissur 680 656, Kerala, India

Received 07 August 2018; received in revised form 28 November 2018; accepted 05 December 2018

Abstract

A study was conducted during 2017-18 at the Department of Floriculture and Landscaping, College of Horticulture, Vellanikkara, Thrissur to standardise the grafting method, age of rootstock and age of scion in African marigold (*Tagetes erecta* L.). The experiment was laid out in Completely Randomised Design with 2 replications and 27 treatments, which comprised of different grafting methods (cleft, splice and hole insertion) using various stages of rootstock (4, 5, 6 and 7 weeks after sowing) and scion (3, 4 and 5 weeks after sowing). Among different treatments followed, cleft grafting 4 week old scion onto 6 week old rootstock was found to be superior in terms of graft survival. There was no survival when grafting was done on four week old rootstock, irrespective of the grafting methods. It was also observed that hole insertion method was not successful, irrespective of the age of root stock and scion.

Keywords: African marigold, Cleft grafting, Hole insertion grafting, Splice grafting.

African marigold (*Tagetes erecta* L.), one among the most important flower crops belonging to the family Asteraceae, is mainly grown as a loose flower crop and used for making garlands, decorations and religious offerings. Due to its varied uses, marigold cultivation is found to be quite remunerative. There is high demand for marigold flowers in Kerala, especially during festival seasons. Neighbouring states act as the major source of the flowers. The agro climatic conditions of Kerala is suitable for successful cultivation of African marigold, throughout the year. However, cultivation of marigold has only been taken up in the near past in Kerala. Nowadays, farmers are using F_1 hybrids of marigold that produce attractive and large flowers. Recently many farmers raising F_1 hybrids were complaining about the sudden wilting of plants, resulting in huge crop loss. This sudden wilting of plant was attributed to infestation by the bacteria *Ralstonia solanacearum*. Nimisha (2016) also reported the incidence of bacterial wilt in African marigold under Kerala conditions. Grafting on wilt resistant root stocks has facilitated successful cultivation of F_1 hybrids and varieties in various solanaceous and cucurbitaceous vegetables. Hundred per cent control of bacterial wilt through grafting in solanaceous crops *viz*., tomato and chilli, was reported by Narayanankutty et al. (2015).

Umesh (2017) had identified one wilt resistant genotype (M-1) in African marigold and reported that grafting of susceptible genotypes on this resistant rootstock was found to be an effective tool for controlling bacterial wilt. However, the study pointed out the need for standardisation of grafting techniques in the crop for maximum graft survival. Keeping this in view, the present study was

*Author for correspondence: Phone: 9446619610, Email: sreeu2005@gmail.com

Int.J.Curr.Microbiol.App.Sci (2018) 7(9): 1245-1260

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 7 Number 09 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.709.149

Determination of the Geomorphologic Parameters of the Thuthapuzha River Basin in Central Kerala, India, Using GIS and Remote Sensing

B.J. Chethan[1*] and B. Vishnu[2]

[1]*KCAET, KAU, Tavanur, Kerala, India*
[2]*RARS, Kumarakom, Kerala, India*

**Corresponding author*

Keywords

GIS, Geomorphologic parameters, Thuthapuzha River basin

Article Info

Accepted:
08 August 2018
Available Online:
10 September 2018

A B S T R A C T

The morphometric analysis of the Thuthapuzha river basin using GIS gives a platform for deriving the geomorphological parameters. This Kerala river basin has dendritic type of drainage network with an elongated basin. The elongated basin is described by shape parameters such as form factor, shape factor, circulatory ratio, and elongation ratio. Lower stream frequency reveals that this basin has less structural disturbance as a result of high surface runoff and fast stream flow. Drainage texture is found to be 10.5 which reveals that the intensity of the stream network is finer indicating that the surface runoff is more. The average bifurcation ratio and stream frequency is found to be 1.83 and 2.4 respectively which describe the stream characteristics. The length of overland flow in the study area is 0.342 which shows that stream erosion is more predominant than sheet erosion in the catchment. The basin is having a ruggedness number of 3.402 which exhibits higher stream velocity, hence Thuthapuzha river basin is prone to soil erosion.

Introduction

India is vast country with abundant natural resources. Land and water are the two most important natural resources. Rivers are primary sources for surface water. Due to the interaction between land and water, the flow characteristics will also change spatially and temporally along the flow path of water. The flow in river is primarily influenced by land surface features and rainfall. The surface features and processes associated with surface features can be better understood by the study called geomorphology (Worcester, 1948). The surface features include rivers, mountains, beaches, sand dunes etc. and these surface features influence the hydrologic response from the river basin. Since hydrologic response (discharge) is associated with surface features then, it can be better understood by the study of hydro-geomorphology (Scheidegger, 1976).

The analysis which is useful for the better understanding of geomorphology is done by geomorphometry and analysis is conducted to derive landform parameters (Pike *et al.*, 1995). The landform parameters also called as geomorphological parameters are derived from mathematical equation (Mark, 2004). Geomorphic parameters can be defined as the stream network, surrounding landscape and

5a

J Krishi Vigyan 2018, 6(2) : 75-77 DOI : 10.5958/2349-4433.2018.00064.8

Effect of Silicon on Soil Physico-chemical Properties in Laterite derived Paddy Soils of Kerala

Guntamukkala Babu Rao[1], Poornima Yadav P I[2] and Elizabeth K Syriac[3]

Krishi Vigyan Kendra, Kottarakkara, Kollam (Kerala)

ABSTRACT

A field experiment was conducted during kharif, 2016 at the farmer's field in Kerala, to evaluate the effect of various sources of silicon on soil pH, OC, EC and soil texture. Experiment was laid out in randomised block design replicated thrice with seven treatments using Uma as the test variety. The treatments comprised of silicon sources viz., fine silica, rock dust, rice husk ash and potassium silicate, along with the recommended dose of fertilizers as per Kerala Agricultural University. Among the treatments, recommended dose of NPK kg/ha+fine silica@50 kg/ha+ rice husk ash@ 250 kg/ha, had shown better results with respect to soil pH and OC.

Key Words: Aluminium, iron, Laterite soils, Organic carbon, Rice, Silicon, Soil acidity, Texture.

INTRODUCTION

Rice is the most vital staple food of Kerala. For the past few years, there was a drastic decrease in area and production of rice due to soil associated constraints (Maneesh and Deepa, 2016). About 65 per cent of Kerala soils are lateritic in nature which requiresdistinct management package as these soils are low to medium in OC, N and K, very low in Ca and Mg. In addition to low fertile soils, high acidity, iron and aluminium toxicities are important soil linked constraints, resulting poor crop productivity in iron toxic laterite soils, especially in lowland situation (GOK, 2016).

Silicon (Si) nutrition in rice helps in enhancement of growth and yield, imparts resistance against lodging, abiotic and biotic stress (Epstein, 2001). Silicon is known to reduce the concentration of toxic elements like Fe, Al, other heavy metals in laterite derived paddy soils and also improve soil physical properties viz. pH, OC, EC and soil texture(Devanur, 2015). Therefore, a continued supply of Silicon would be required for the healthy and productive development of plant during all growth stages(Savant *et al,* 1997; Rao *et al,* 2017). With this background the present investigation was undertaken with an objective to assess the affect of silicon nutrition in rice on soil physic-chemical properties of laterite soils of Kerala.

MATERIALS AND METHODS

The field study was carried out at farmer's field in Kerala, during Kharif 2016. The soil of the experimental site was sandy clay loam, acidic in nature (pH 4.5), high in OC (1.01%) and EC (0.1 dS/m). Several silicon sources *viz*., fine silica, rock dust, rice husk ash and potassium silicate were used along with recommended fertilizers. All treatments were supplied with similar recommended dose of fertilizers i.e. lime@ 150kg/ha+farm yard manure@ 5t/ha+ NPK@ 90:45:120 kg/ha. The treatments were T1: Fine silica@ 100kg/ha; T2: Fine silica@ 75kg/ha+ rock dust@ 25kg/ha; T3: Fine silica@ 75 kg/ha+ foliar application of K_2SiO_3 at maximum tillering stage@ 0.5%; T4: Fine silica@ 50 kg/ha+ rock dust@ 25kg/ha+ foliar application of K_2SiO_3 at maximum tillering stage@ 0.5%; T5: Fine silica@ 75 kg/ha+ rice husk ash@ 125kg/ha;T6: Fine silica@ 50kg/ha+ rice husk ash@ 250kg/ha; T7: Fine silica@ 50kg/ha+ rice husk ash@ 125kg/ha+ foliar application of potassium silicate at maximum

Corresponding Author's Email: sekhar2486@gmail.com

[1]M.Sc. Scholar, Department of Agronomy, College of Agriculture, Vellayani, Kerala

[2]Assistant Professor, Krishi Vigyan Kendra, Kottarakkara, Kollam, Kerala

[3]Professor, Kerala Agricultural University, Thiruvananthapuram, Kerala

Elimination of sugar rich confectioneries in children with ADHD symptomatology.

SL NO 52

View full text

Author(s) : Beela, G. K. ; Raji, V. R.

Author Affiliation : Department of Home Science, Kerala Agricultural University, Centre for Disability Studies, Poojapura, Thiruvananthapuram (Kerala), India.

Author Email : beela.gk@kau.in , rajirajesh2007206@gmail.com

Journal article : Food Science Research Journal 2018 Vol.9 No.1 pp.143-149 ref.many

Abstract : Learning disabilities such as Attention Deficit Hyperactivity Disorder (ADHD) which is also a neurobehavioral disorder are increasing and are currently drawing concern. This study is a randomised controlled trial into the effect of elimination of sugar rich confectioneries diet on the behaviour of a random group of school going children who meet the DSM IV criteria for ADHD. The recent controlled studies on nutrition and ADHD recommends that diets to reduce symptoms associated with ADHD include sugar restricted additive and preservative free, oligoantigene and elimination diet. In the present study a questionnaire consisting of 25 questions in the form of five scale rating was administered to the subjects in six sessions to determine the prevalence of ADHD symptoms during the diet intervention with elimination of sugar rich confectioneries diet. Fifty children of the age group of 4-12 years with ADHD symptoms were selected. Experimental group consisted of 30 children and Control group consisted of 20 children. Experimental group underwent diet interventions and counselling in six sessions whereas the Control group were not subjected to diet intervention. Statistical analysis was carried

RESEARCH PAPER — FOOD SCIENCE RESEARCH JOURNAL

e ISSN-2230-9403 ■ Visit us : www.researchjournal.co.in
Volume 9 | Issue 1 | April, 2018 | 143-149
DOI : 10.15740/HAS/FSRJ/9.1/143-149

Elimination of sugar rich confectioneries in children with ADHD symptomatology

SL NO 52

G.K. Beela and V.R. Raji

Learning disabilities such as Attention Deficit Hyperactivity Disorder (ADHD) which is also a neurobehavioral disorder are increasing and are currently drawing concern. This study is a randomised controlled trial into the effect of elimination of sugar rich confectioneries diet on the behaviour of a random group of school going children who meet the DSM IV criteria for ADHD. The recent controlled studies on nutrition and ADHD recommends that diets to reduce symptoms associated with ADHD include sugar restricted additive and preservative free, oligoantigene and elimination diet. In the present study a questionnaire consisting of 25 questions in the form of five scale rating was administered to the subjects in six sessions to determine the prevalence of ADHD symptoms during the diet intervention with elimination of sugar rich confectioneries diet. Fifty children of the age group of 4-12 years with ADHD symptoms were selected. Experimental group consisted of 30 children and Control group consisted of 20 children. Experimental group underwent diet interventions and counselling in six sessions whereas the Control group were not subjected to diet intervention. Statistical analysis was carried out using ANOVA and T test to compare the pre and post intervention scores and the scores of the experimental and control group. This study establishes that elimination of sugar rich confectionaries like chocolates, bakery confectionaries and soft drinks in the diet and replacing with highly nutritive value foods as per the RDA can reduce the ADHD symptoms in school going children of age group 4-12.