Review

# Neem in pest management

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**ABSTRACT**

Extensive basic and applied research conducted over the past thirty years has shown that the use of natural and enriched products derived from the neem tree, *Azadirachta indica* (A. Juss.), can provide a key component in integrated pest management. The formidable array of more than 100 bio-active compounds from different parts of the neem tree make it a unique plant with potential applications in pest management. Compared with quick 'knockdown' effects of persistent and vagrant synthetic pesticides, neem's subtle effects, such as repellence, feeding and oviposition deterrence, growth inhibition, mating disruption, chemosterilisation, etc. are far more desirable in pest management as they reduce the risk of natural enemies to poisoned food or starvation. In spite of high selectivity, neem materials affect more than 500 species of insect pests, one species of rice ostracod, polyphagous mites, mites and ticks affecting man and animals, parasitic protozoans, noxious molluscs, plant parasitic nematodes, pathogenic fungi, and harmful bacteria and fungi. Results of field trials conducted using neem materials for the management of pests affecting some major food crops (rice, maize, sorghum, millets, and banana), selected grain legumes, and vegetable pests are reported here to illustrate the value of neem in sustainable integrated pest management

**Key words:** *Azadirachta indica*, neem, pest management

Organic Farming

# Organic seed production of onion (*Allium cepa* L.)

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**ABSTRACT**

A field trial was undertaken on organic seed production of onion variety Agrifound Light Red and Agrifound Dark Red during Rabi, 2004-05 and 2005-06 at Regional Research Station, Nasik. Two packages of organic treatments were compared with control where recommended dose of fertilizers and pesticides were applied. The result of the study revealed that organic package of vermicompost @ 3t $ha^{-1}$ or FYM @ 50t $ha^{-1}$ + neem cake @ 1t $ha^{-1}$ + *Trichoderma viride* @ 2500g $ha^{-1}$ + Azotobactor @ 12.5 kg $ha^{-1}$ + PSB @12.5kg $ha^{-1}$ + Pacelomyces @125kg $ha^{-1}$ at planting + spraying of azadirection @ 0.15 per cent at 30, 45, 75 and 90 days after planting and *Trichoderma viride* @ 0.4 per cent at 45, 75 and 105 DAP could be used with 26.37 per cent (vermicompost) and 28.80 per cent (FYM) lower seed yield than check treatment, when organically produced onion seed is required for organic bulb production in Agrifound Light Red while in Agrifound Dark Red with 18.65 per cent (vermicompost) and 32.72 per cent (FYM) lower seed yield.

**Key words:** Organic farming, Organic packages, Agrifound Light Red, Agrifound Dark Red, Seed quality parameters.

# Effect of various organic solvents on extraction and degradation of chlorophyll in leaves of *Parthenium hysterophorus*

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**ABSTRACT**

Chlorophyll is the major light absorbing pigment in green plants. The therapeutic and physiological activity of chlorophyll renders it a potential molecule for wide variety of medical and commercial applications. Thus, it becomes necessary to choose a solvent that extracts most of the chlorophyll from plant leaf and also controls its degradation to maximum extent so that the chlorophyll may be isolated and purified to be used commercially. Different organic liquids that serve as solvents for chlorophyll are unequally suitable for the extraction of the pigment from the leaves. In the present investigation, the effect of different solvents namely- acetone, butanone, ethanol, methanol, DMF, DMSO, chloroform, hexane and diethyl ether on extraction of chlorophyll was studied using leaves of *Parthenium hysterophorus* (family: Asteraceae). Extraction was found to be comparable in DMF, DMSO and alcohols. The pigment concentration was determined using UV-Visible spectrophotometry. Rate of degradation of chlorophyll varied in different solvents and was found to be fastest in DMF and DMSO and slowest in acetone and ethanol.

**Keywords:** Absorption spectroscopy; chlorophyll absorption; chlorophyll breakdown; extraction; polarity of solvents

# Integrated nutrient management in rice under temperate conditions

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**ABSTRACT**

The study revealed that application of recommended fertilizer dose (RFD) + poultry manure @ 20t ha$^{-1}$ significantly improved all growth characters viz., plant height, tiller production, dry matter accumulation and leaf area index of rice up to harvest. The yield attributes viz., panicle length and number of spikelets panicle$^{-1}$ were significantly higher with application of RFD + poultry manure @ 20t ha$^{-1}$, whereas grains panicle$^{-1}$ and panicles m$^{-2}$ were significantly higher with application of FYM @ 20t ha$^{-1}$ + 75% recommended fertilizer dose. The grain yield (79.6q ha$^{-1}$) was significantly more in FYM @ 20t ha$^{-1}$ + 75% recommended fertilizer dose, whereas straw yield (97.5q ha$^{-1}$) was significantly higher with application of recommended fertilizer dose + poultry manure @ 20t ha$^{-1}$. Nitrogen and phosphorus uptake by crop at harvest was significantly higher in (poultry manure @ 20t ha$^{-1}$ + 75% RDF), whereas potassium uptake was higher in the treatment with recommended fertilizer dose + poultry manure @ 20t ha$^{-1}$. It was also found that available nitrogen, phosphorus and potassium balance in soil after harvest of crop was higher in all treatments except the plot receiving sole inorganic fertilizer which showed a negative balance of available nitrogen and equal balance of available phosphorus compared to their initial status. Amongst the treatments RFD + poultry manure @ 20t ha$^{-1}$ ($T_{15}$) recorded higher balance of nutrients in soil. Although the highest grain yield (79.69q ha$^{-1}$) was realized with application of FYM @ 20t ha$^{-1}$ + 75% RFD ($T_7$), the highest benefit cost ratio of Rs.1.93 and highest net returns of Rs. 39,736 were realized with the treatment receiving BGA @ 0.5kg ha$^{-1}$ + 75% RFD ($T_{11}$).

**Key words:** Integrated nutrient management, silty clay loam soil, randomized block design, recommended fertilizer dose (RDF), temperate conditions.

# Cysteine proteinase-like gene has role in symbiotic properties of *Mesorhizobium ciceri* TAL620

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**ABSTRACT**

*Mesorhizobium ciceri* TAL 620, a chickpea rhizobium was mutated by random insertion of transposon, Tn5 using the Tn5 donor strain *E. coli* S17 (pSUP:5011::Tn5). Among the Tn5 exconjugants obtained, a Tn5 mutant strain *Mesorhizobium ciceri* TL9, unable to grow with ammonium as the sole nitrogen source was isolated and characterized. *M. ciceri* TL9 was observed to cytosine, guanine, uridine or riboflavin requiring mutant. Unlike its wild type parent, the mutant TL9 had dependence on one or more of these metabolites to grow. Mutant TL 9 was characterized to be symbiotic defective. It was observed to be a fix$^-$ mutant as it formed only few white colored nodules on the chickpea plant, which were incapable of nitrogen fixation and thus, the plant showed retarded growth. Inverse PCR studies were carried out and the flanking region of the Tn5 insertion in *M. ciceri* TL9 sequenced. Blast analysis of sequencing data revealed the role of a cysteine proteinase-like gene in the symbiotic pathway of *M. ciceri*.

**Keywords:** *Mesorhizobium ciceri* TAL 620, Tn5 mutagenesis, auxotrophs, symbiotically defective, inverse PCR, cysteine proteinase

**Human Ecology / Home Science**

# Development of various products by incorporating dehydrated *Colocasia* leaves

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**ABSTRACT**

*Mathri* and *Aloo tikki* incorporation with 2 per cent dehydrated colocasia leaves was found to best with regard to taste and flavor. In case of Tomato soup incorporation with 1 per cent dehydrated colocasia leaves was found to be best with regard to colour and appearance, consistency, taste and flavor and over all acceptability. *Mathri* prepared with 3 per cent incorporation of dehydrated *Colocasia* leaves was found to be high in fibre (0.79g), calcium (68.69mg), and total carotene (496µg). Tomato soup (3 per cent incorporation level) was found to be high in fibre (1.18g), calcium (66.74mg) and total carotene (870µg). *Aloo Tikki* (3 per cent incorporation level) was found to be high in fibre (2.91g), calcium (57.37mg) and total carotene (645µg). Nutritive value of formulated food products were better as compared to control and increased with the increase in incorporative levels of dehydrated *Colocasia* leaves.

**Keywords:** Dehydration, *Colocasia* leaves, Nutritive value, *Mathr*i, Tomato soup and *Aloo tikki*

**Entomology**

# Evaluation of sorghum hybrids against shoot fly, *Atherigona soccata* Rondani

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**ABSTRACT**

Twenty four hybrids were screened along with resistant (IS-2312) and susceptible (DJ-6514) checks against shoot fly, *Atherigona socccata* Rondani under natural infestations. The sowing was taken up during first week of August 2004 in such a manner that one infester row was sown after every five lines of genotypes, so as to create more infestation by the pest. The entries were sown in a single row of four meter length in a randomized block design with three replications. At 28th DAE, no genotype was found completely free from the shoot fly infestation. The hybrids SPH 1465 and CSH 16 recorded significantly highest per cent deadhearts (71.76 and 71.02%, respectively) and were at par with susceptible check (81.78%). The hybrid CSH 18 was found least susceptible by recording 26.12 per cent deadhearts and was next best to resistant check (10.60%). The hybrids SPH1476, SPH1479 and SPH1470 recorded higher yield even though they produced highest per cent deadhearts. So, the reaction of these hybrids can be improved through breeding programme and the yield of these hybrids can be improved further.

**Key words:** Sorghum shoot fly, *Atherigona socccata*, hybrids, resistance screening

# Age specific survival and fecundity table of Capitulum borer, (*Helicoverpa armigera*) Hubner in sunflower (*Helianthus annuus* L.)

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**ABSTRACT**

The life table and key mortality factors of *Helicoverpa armigera* was developed on *cv.* Modern of sunflower (*Helianthus annuus*) during rabi, 2009-10. It is apparent from the result that the period II (11th days after hatching), larvae were found to be more vulnerable to natural mortality factors (31.43%). The highest survival rate was recorded in adult stage. The generation survival (SG) of 0.3189 exhibited 31.89 per cent of the initial population of this pest could survive and complete its generation, successfully. The number of larvae noticed dying due to entomogenous fungus *Numeria rileyi*, was registered highest (52.74%), contributing maximum 'K' value. The highest 'K' value was recorded in period II larvae, exhibited as 0.1584. The population potential fecundity (PF) was computed 319.82 eggs. The net reproductive rate resulted to be 150.146 with the mean duration of generation (Tc) 43.148 days. Weekly multiplication rate and doubling time were 2.28 females female$^{-1}$ day$^{-1}$ and 5.87 days, respectively.

**Key words:** Life table, generation survival, mortality, net reproductive rate, *Helicoverpa armigera, Helianthus annuus,* generation time.

# Comparative efficacy of aqueous and ethanol plant extracts against *Spodoptera litura* Fab. larvae

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**ABSTRACT**

Efficacy of aqueous and ethanol extracts of eight plant species viz. *Acacia arabica* (leaves and seeds), *Annona squamosa* (leaves and seeds), *Datura stramonium* (leaves and seeds), *Eucalyptus globules* (leaves), *Ipomoea carnea* (leaves), *Lantana camara* (leaves), *Nicotiana tabacum* (leaves) and *Pongamia pinnata* (leaves) was compared against 3rd instar larvae of *Spodoptera litura*. Mean larval mortality due to aqueous extracts ranged from 30.18 per cent on 1st day of exposure to treatments to 69.33 per cent on 6th day, while mortality due to ethanol extracts ranged from 28.32 per cent to 72.20 per cent during same duration. Among different extracts, efficacy of ethanol extracts was relatively higher than that with corresponding aqueous extracts except leaf extracts from *Acacia arabica*, *Annona squamosa* and *Datura stramonium*. Mean larval mortality with 10 % ethanol extract was considerably higher than that even with 100 per cent concentration of aqueous extract. The results of this study clearly established potential of plant based bio-insecticides in the management of lepidopteran defoliators infesting various crops as a major tool in Integrated Pest Management.

**Key words:** Aqueous extract, ethanol extract, *Spodoptera litura*

# Correlation of bio-chemical parameters of *rabi* sorghum genotypes with shoot fly, aphid and shoot bug incidence

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**ABSTRACT**

Biochemical causes of resistance against shoot fly (*Atherigona soccata* Rondani), aphid (*Melanaphis sacchari* Zehntner) and shoot bug (*Peregrinus maidis* Ashmead) in fifty three genotypes of *rabi* sorghum with varied level of pest infestation were studied. There was no significant correlation between shoot fly, aphid and shoot bug resistant and biochemical constituents of *rabi* sorghum genotypes selected for comparison. However, non-significant and negative correlation was observed between chlorophyll index, nitrogen, phosphorous and potash with shoot fly dead heart formation at 28 days after emergence of the crop. Chlorophyll index and nitrogen were positively but non-significantly correlated, whereas, phosphorus and potash were negatively but non-significantly correlated with aphid density. Positive correlation was observed between chlorophyll index and potash, whereas negative correlation was observed between nitrogen and phosphorus with shoot bug population density and shoot bug plant damage.

**Key words:** Chlorophyll, Nitrogen, Phosphorous, Potash, Shoot fly, Aphid, Shoot bug, *rabi* Sorghum

# Eco friendly approaches for the management of rice leaf folder, *Cnapholocris medinalis* (Guenee)

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**ABSTRACT**

Effect of different botanicals, parasitoids and biopesticide on freshly damaged leaves and mean larval population of rice leaf folder, *Cnapholocris medinalis* (Guenee) and yield of rice was studied at the Agricultural Research Station (Paddy), Sirsi, Karnataka during *kharif*, 2009. The results revealed that Balsam tree, *Gnidea glauca* (Fresen.) Gilg leaf extract was proved best, by recording 0.80 freshly damaged leaves and 0.12 larvae per hill which was on par with chlorpyriphos 20 EC @ 2 ml $l^{-1}$ (0.60 freshly damaged leaves and 0.04 larvae $hill^{-1}$). Whereas, *Trichogramma chilonis* (Ishii) and *T. japonicum* Ashmead registered significantly highest number of damaged leaves and larvae per hill by recording 3.85 and 3.90 freshly damaged leaves and 1.68 and 1.72 larvae $hill^{-1}$ after seven days of treatment, respectively. The lower parasitization by *T. chilonis* and *T. japonicum* was due to heavy rains during the experimental period which restricted the parasitoid releases only two times and this would be the reason for poor performance of *Trichogramma* spp. in managing leaf folders.

**Key words:** *Gnidea glauca*, *Cnapholocris medinalis*, *Nomuraea rileyi*, Botanical

# Acaricidal bioefficacy of eco-friendly pesticides agaisnt the red spider mite (*Tetranychus ludeni* Zacher) infesting cowpea

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**ABSTRACT**

An overall result of a laboratory experiment conducted over a period of two year revealed that micronised sulphur (Mitex – S) @ 0.25 per cent proved to be most effective followed by NSKE 5 per cent, neem oil 3 per cent, wettable sulphur (0.25%) among the eco-friendly pesticides, in causing mortality of the mite (*Tetranychus ludeni* Zacher). It was found that Neem seed kernel extract (NSKE- 5%) proved to be superior to commercial neem based products viz. Neemectin (1.0%) and Neembecidihe (1.0%). The locally available Karanj oil (2 and 3%) also proved moderately effective in causing mortality of the mite (*T. ludeni*). However, in terms of overall efficacy, dicofol (0.05%) proved most effective against the pest mite (*T. ludeni*), which caused the mite mortality upto 92 per cent.

**Key words :** Cowpea, *Tetranychus ludeni,* pesticides, eco-friendly, acaricides.

# Integrated management practices for major insect pests of maize

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**ABSTRACT**

The present investigation was carried out to evaluate IPM modules for insect pest complex of maize (on hybrid maize EH-434042) at the Agricultural Research Station, Bagalkot during 2008-09. Among the four modules evaluated (M1, M2, M3 and M4), module M2 (Seed treatment with endosulfan 35 EC @ 5 ml + 25 ml water against sucking pests and shoot fly, application of carbofuran 3 G @ 30 kg $ha^{-1}$ against stem borer and armyworm at 30 days after sowing (DAS), spray of endosulfan 35 EC @ 2ml $l^{-1}$ of water at 45 DAS against aphids and stem borer and spray of carbaryl 75 WP @ 4g $l^{-1}$ at 60-70 DAS against cob worm) recorded lesser incidence of stem borer, armyworm, aphid, and cobworm as compared to other modules. With respect to all the pests module M4 (untreated control) recorded maximum incidence of insect pests. Significantly higher

fodder and grain yield was obtained from module M2 followed by M3, M1 and M4. Higher number of predators were noticed in M4 module as compared to other modules.

**Key words**: IPM modules, Maize pests, Maize hybrid EH-434042

# *In vitro* efficacy of botanical extracts on sciarid fly (*Bradysia tritici* Coq.) on white button mushroom

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**ABSTRACT**

*Azadirachta indica* treatments (0.5, 1.0 and 2.0%) after 24, 48 and 72 hr's of exposure were most effective against sciarid fly larvae and lowest mortality was recorded with *Datura stramonium* at each concentration at different interval. Extracts of *C. cinerifolium*, *Juglans regia*, *D. stramonium* and *Matricaria chamomilla* treatments inhibited the mycelial growth of *A. bisporus* over control.

**Key words**: Botanicals, *Bradysia tritici*, efficacy, growth, white button mushroom

# Reaction of major pests in initial and advanced hybrid varietal trials of sorghum

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**ABSTRACT**

The study was carried out during *rabi* 2006-07 at the Regional Agricultural Research Station, Bijapur, Karnataka, India. The entries from Advanced Varietal and Hybrid Trial-I, Advanced Varietal and Hybrid Trial-II, and Initial Varietal and Hybrid Trial were selected for the experiment along with resistant (IS 2312 for shoot fly, Y 75 for shoot bug and T x 428 for aphid) and susceptible checks (DJ6514 for shoot fly, Hathi Kuntha for shoot bug and 296B for aphid). The entries *viz*. SPV 1601, SPV 1680, SPV 1709, SPV 1762, SPV 1768, SPV 1796, SPV 1797, SPV 1800, SPV 1803, SPV 1804, SPH 1449, CSV 216R, CSH 15R, M 35-1 and Maulee were found to be resistant to shoot fly based on deadhearts, seedlings with shoot fly eggs, trichomes on the lower leaf surface, seedling vigour and leaf glossiness. Among the different genotypes screened, none of the test entries was found resistant to aphid except resistant check T x 428 whereas Y 75 and CSH 15R were moderately resistant. Significantly lower percentage of plant damage due to sorghum stripe disease caused by shoot bug was recorded in T x 428, CSV 216R and CSH 15R and were at par with resistant check Y 75. The genotypes CSH 15R and CSV 216R exhibited multiple resistance to shoot fly and shoot bug. The genotype T x 428 was found to posses multiple resistances to aphid and shoot bug.

**Key words:** Shoot fly, aphid, shoot bug, resistance, multiple resistance

## Plant Pathology

# Integration of *Trichoderma harzianum* 5R with low dose of sulphur dioxide generator sheet for control of post harvest decay of Tas-A-Ganesh

# (*Vitis vinifera* L.) during and after long duration low temperature storage

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**ABSTRACT**

Three isolates of *T. harzianum* were evaluated for their antagonistic potential against the post harvest pathogens of grapes. The two virulent isolates, RR and 5R, were subsequently tested in field, as pre-harvest applications, for their efficacy in preventing post harvest decay during storage and subsequently when the grapes were transferred to shelf. Isolate 5R which was more effective, was further tested in field to standardize the method of application and effective spore concentration. These studies revealed that a single pre-harvest application of aqueous suspension of *T. harzianum* 5R, as spray, containing $1´10^5$ spores $ml^{-1}$ at 20 days before harvest (DBH) followed by low temperature storage of grapes with sulphur dioxide generator sheet containing 2.3 g (lower dose) instead of 3.5g sodium metabisulphite (normal dose) for every 5kg of grapes, could effectively manage the post harvest decay and also minimize the sulphur dioxide injury during storage. However, to prevent fungal growth on the bunch and to maintain the berry freshness for a longer period on the shelf, two pre-harvest spray $1´10^6$ spores $ml^{-1}$ at 20 and 3 DBH were required along with the lower dose of the generator sheet.

**Key words :** Pre-harvest application, post harvest management, sulphur dioxide generator sheet

# Management of grapevine anthracnose with botanicals and bio-control agents

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**ABSTRACT**

Antifungal effects of 15 plant extracts, Neem oil 80EC, Pungam oil 80EC and Neem + Pungam 60EC oil and nine antagonistic organisms were investigated *in vitro* against the mycelial growth and conidial germination of *Gloeosporium ampelophagum* causing anthracnose disease in grapevine. Neem + Pungam oil 60EC (3%), leaf extract of *Catharanthus roseus* (10%) and neem oil 80 EC (3%) were inhibitory to the mycelial growth and conidial germination of *G. ampelophagum*. Among the antagonistic organisms *Trichoderma viride* and *Pseudomonas fluorescens* adversely affected the growth and conidial germination of the pathogen. Post inoculation spraying of Neem + Pungam oil 60EC (3%), Neem oil 80EC (3%), *Catharanthus roseus* leaf extract (10%) and talc based formulation of *Pseudomonas fluorescens* in the green house was found to be promising in preventing the disease. Spraying of the above mentioned botanicals and biocontrol agent thrice, first spray after the initiation of the disease and second and third at 10 days intervals effectively controlled the disease in the field.

**Key words**: Grapevine, anthracnose, plant extracts, plant oils, biocontrol agents, management

# Role of soil amendment with *Trichoderma viride* and carbendazim in presence of the wilt pathogen on growth and yield of tomato

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**ABSTRACT**

A better alternative to the chemicals are the rhizosphere plant growth promoting microorganisms that have been reported to promote the growth and yield of crop plants. Effect of *Trichoderma viride* and *Fusarium oxysporum* f. sp. *lycopersici* isolated from the rhizosphere of plants was studied in combination with carbendazim on the growth and yield of tomato (*Lycopersicon esculentum* Mill.) grown in soil amended with their inocula under field conditions. *Trichoderma viride* was found to be antagonistic to the wilt pathogen resulting in reduced incidence of the disease and exhibited plant growth stimulating activity on tomato plants. The antagonistic activity of *Trichoderma viride against* the wilt pathogen and its growth promoting ability on tomato plants was found to increase when it was applied in combination with carbendazim in the soil.

**Key words:** *Trichoderma viride,* wilt pathogen, carbendazim, *Lycopersicon esculentum*

**Post Harvest Technology**

# Heat survival dynamics of *Zygosaccharomyces bailii* from stored aonla juice

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**ABSTRACT**

Spoilage yeast *Zygosaccharomyces bailii* was isolated from stored aonla juice showing excessive frothing. The $SO_2$ content in this juice at the time of sampling was 750 ppm. Heat resistance pattern of the yeast isolate was studied. It was observed that increasing the heating temperature from 80 to 100$^0$C resulted in four log reduction in yeast population. However, this budding yeast could survive boiling at 100$^0$C for 20 min. To further study the possible spoilage potential of this organism in other aonla products, effect of sugar and acid concentration on its heat resistance was studied. An increase in sugar concentration in the medium from 1 to 5 per cent resulted in increased heat resistance. At 5 per cent sugar concentration, 10 times more population of isolate survived heating as compared to 1 per cent sugar containing media. An increase of acidity (0.5 to 2 per cent) in 5 per cent sugar containing media, further added to the heat resistance of the yeast isolate. At 2 per cent acidity level, survival of colonies increased up to 20 times. The yeast was found to have high invertase activity of 0.0698 µM ml$^{-1}$ min$^{-1}$. Maximum invertase activity was observed at 50$^0$C (0.11198 µM ml$^{-1}$ min$^{-1}$). The $K_M$ and $V_{max}$ values were found to be 16.683 mg ml$^{-1}$ and 160.256 µM ml$^{-1}$ min$^{-1}$, respectively. Owing to the high heat resistance coupled with invertase activity, this yeast isolate may prove to be a potential spoilage microorganism of aonla products.

**Key words:** Indian gooseberry, spoilage, yeast, *Zygosaccharomyces bailii,* invertase, heat resistance

**Short Communication**

# A new record of Mexican beetle *Zygogramma bicolorata* Pallister on *Parthenium hysterophorus* L. from Sabour (Bihar)

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**Key words:** *Parthenium hysterophorus* L., *Zygogramma bicolorata* Pallister, Mexican beetle, predator.