IntegratedPestManagementofBrownPlantHopper(BPH),*Nilaparvatalugens*(Stal)inriceofMancherialDistrict,TelanganaState, India.???

Comment [I1]: Mancherial district is a district located in the northern region of the Indian state of Telangana.[2][3] The district comprises 18 mandals and two revenue divisions – Mancherial and Bellampalli. The district headquarters is located at Mancherial town.[4] It is surrounded by Komaram Bheem, Nirmal, Jagtial, Peddapalli and Bhupalpally districts of Telangana and with Maharashtra state.

?????in which part of the district of Macherial were the surveys carried out ?????? It should define with greater precision where the studies were carried out. There are 18 mandals and two divisions: Mancherial and Bellampalli ??????

Comment [I2]: COUNTRY?????

Type of papers

. 2- Short Research Articles:

Short Research Articles (or Research Notes) are single-finding papers (or one year experiment for agricultural papers) that can be reported with one or two illustrations (figures/tables) and lab protocols. Posters from conferences or internal meetings may be summarized as Short Research Articles (or Research Notes). In many cases, some additional detail, particularly in the methods, description of the results, and/or discussion/conclusions will be required to make sure that readers (and referees) have enough information to understand the description of the work. We advise a length of 3000-4000 words, plus 3-4 figures and/or tables, and 15-20 key references.

Title Page
The title page should contain a brief title, name(s) of author(s) and their affiliations. The title should be without any abbreviations and it should enlighten the contents of the paper.

Abstract

Afrontlinedemonstrationonintegratedpestmanagementofbrownplanthopper, *Nilaparvata lugens* (Stal) in rice has been conducted in different villages of various mandals ofMancherial district of Telangana state during the *kharif* (June – December), season of 2018–19,2019–20 and 2020–21 respectively to create of awareness among the farming community on theintegratedpestmanagementpractices.TheadoptionofIPMpracticesincludesformationofalleyways, recommended dose of nitrogen fertilizer, alternate wetting and drying, spraying of needbasedinsecticideslikeDinotefuran20SG@0.4gorPymetrozine50WDG@0.6g l^{-1}ofwateretc. were carried out. The study reveals that the lowest hoppers incidence was witnessed in thedemonstratedplotwith1.84,12.18and19.0adultshill^{-1}intilleringstageand7.76,24.95and52.38adultshill^{-1}inpaniclestageover farmers practice(3.33,35.40 and 25.42 adultshill^{-1}intilleringstageand19.84,50.30and63.47adultshill^{-}

Comment [I3]: 258 WORDS / 250
Research Papers and Short Notes should follow the structure of Abstract,
- INTRODUCTION,
- METHODOLOGY,
- RESULTS AND DISCUSSION,
- CONCLUSION,

Acknowledgements, Competing Interests, Authors' Contributions, Consent (where applicable), Ethical approval (where applicable), and References plus figures and/or tables.)

Abstract
The abstract should be concise and informative. It should not exceed 300 words in length. It should briefly describe the purpose of the work, techniques and methods used, major findings with important data and conclusions. Different sub-sections, as given below, should be used. No references should be cited in this part. Generally non-standard abbreviations should not be used, if necessary they should be clearly defined in the abstract, at first use.

[1)].TheaverageyieldsofIPMmoduledemonstratedplotwas7130,5513and5065kgha-1whereasinfarmerpracticetheyieldwas

6733,4851and4768kgha-1during(June–December),2018–19,2019–20and2020–21respectively with anincreasedyield of5.88%,13.64% and 6.22% during corresponding *kharif*(June–December),2018–19,2019–20 and2020–21.Further the Cost-Benefit ratioof1.88,2.68and1.78respectivelyinthetechnologydemonstratedplotswhereasinfarmerspracticetherecorded Cost-Benefit ratio of 1.43, 1.94 and 1.48 during corresponding *kharif* (June–December),2018–19,2019–20and2020–21respectively.

Keywords: BrownPlantHopper,Insecticides,IntegratedPestManagement,Rice

1. Introduction

Rice(*Oryza sativa* L.) isan important cereal crop oftheworld and second largestcultivatedcrop after wheat (Hosseini et al., 2012)and providing a staple food for more than half of the worldpopulation (Kulagod, 2011). It is the principal nutritional energy source for 17 Asian and Pacificcountries,9NorthandSouthAmericancountriesand8Africancountriesanditalo neprovidesthe20% oftheworld'sdietary energy supply (FAO,2004).The cropis attacked by 300 insectpests inthe different stages of the crop and among them only 23 species causes notable damage (Pasalu andKatti,2006).Among which brown plant hopper,*Nilaparvata lugens* (Stal), (Hemiptera: Delphacidae)isoneofthemosteconomicallysignificantinsect-pestsofriceinmostoftheAsiancountriescausinga noticeable damageto thecrop by reducing theyields ranges from 10%–90% and in Asia the losshavebeenestimatedasmorethan$300millionannually(Minetal.,2014).Iftimelyco ntrolmeasures are not taken up, there may be a chance of total crop loss within a very short period (Cheng,2009). In addition to this it also transmits the ragged stunt virus, striped virus and grassy stunt virus(Gurr et al., 2011, Bottrell and Schoenly, 2012). Recently, most of the rice cultivars depend solely onchemicals to manage the pest and the outbreaks are due to excessive insecticide use (Way

Comment [I4]: .

All references should follow the following style:
Reference to a journal:
For Published paper:
1. Hilly M, Adams ML, Nelson SC. A study of digit fusion in the mouse embryo. Clin Exp Allergy. 2002;32(4):489-98.
Note: List the first six authors followed by et al.
Note: Use of DOI number for the full-text article is encouraged. (if available).
Note: Authors are also encouraged to add other database's unique identifier (like PUBMED ID).

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Reference style
References must be listed at the end of the manuscript and numbered in the order that they appear in the text. Every reference referred in the text must also present in the reference list and vice versa. In the text, citations should be indicated by the reference number in brackets [3].

and Heong,1994).Thesearchandevaluationofnewinsecticidemoleculesmustalsobeasystematicpracticesoastodevelopsaferandeffectivealternativestominimalizethebrownplanthoppersdamage(Lakshmietal.,2010,Ratnakaretal.,2019).Thiscontinuousandindiscriminateuseofoneinsecticide has resulted in the rapid development of insecticide resistance and exhaustion of mostinsecticide options in many rice-growing regions (Wang et al., 2009) including organophosphates,carbamates,pyrethroids,neonicotinoidsandphenylpyrazoles(MatsumuraandMorimura,2010).Insecticidesremain,asasignificantweaponintheintegratedpestmanagement(IPM)systembecauseof its speedy, efficient, economical and easy to use against pests (Karunaratne et al., 2007, Xue et al.,2010,Perryetal.,2011).ToovercometheselapsesKVKsactsasaKnowledgeandResourceCentreat district level to demonstrate the technologies (Sharma et al., 2017) and the output of the research isdisseminatedtofarmersthroughconductionoffrontlinedemonstrationsaboutthedeveloped

technologies(Singhetal.,2007).ForthisIPMtechnologiesneedtobepracticedincluster approachto manage the pest (Shankar et al., 2022). Integrated pest management (IPM) practices is one of theeco-friendly approaches, which can be applied to regulate the indiscriminate use of insecticides tocontrolriceinsectpests(Singhetal.,2018,TrivediandAhuja,2011).Hence,thefollowingintegratedpestmanagementmoduleunderfrontlinedemonstrationswereformulatedwithallintegrated approaches like formation of alleyways, recommended dose of nitrogen fertilizer, alternatewetting anddryingarebeingadded along withchemical controltomanagebrownplant hopper,*Niaparvathalugens*(Stal)inthepresentstudyconductedbyKrishiVigyanKendra,Bellampalli,Mancherial District, which was undertaken during kharif (June–December), 2018–19, 2019–20 and2020–21 respectively to manage the brown plant hopper, *Niaparvatha lugens* (Stal) by instigatingintegratedpestmanagementpracticesinthefarmerfieldsofvillagesinthevariousmandalsofMancherialdistrictofTelanganastate.

2. MaterialsandMethods

a)- Materials:????????insecticides like Dinotefuran 20 SG @ 0.4 g or Pymetrozine 50 WDG @ 0.6 g l-1 of water.

The present study was carried out, in *kharif*season in the different villagesof Mancherialdistrictduring*kharif*(June–December),2018–19,2019–20and2020–21bytheKrishiVigyanKendra,Bellampalli.Inthisstudy,30farmerswereselectedforthedemonstrationofthetechnology.Theimprovedtechnologywereimposed,consistingformationofalleyways,recommendeddoseofnitrogenfertilizer,alternatewettinganddrying,sprayingofneedbasedinsecticides like Dinotefuran 20 SG @ 0.4 g or Pymetrozine 50 WDG @ 0.6 g l^{-1} of water.ThetreatmentsofsprayingofAcephate75SP@1.5gorImidacloprid17.8SL@0.25mlorBuprofezin 25 SC @ 1.6 ml or Imidachloprid+Ethiprole 40 WG @0.25 g l^{-1} of water after noticingtheheavyinfestationsof*N.lugens*(Farmerspractice).Thehopperpopulation(

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Comment [I6]: METHODS ????????

nymphoradult)hill^{-1} was recorded during the vegetative and reproductive stage of the crop after each spray and 7 daysafter eachapplicationandpercentreductionover controlofhopperswas calculated.Finally,thegrain yield (kg ha^{-1}) and cost - benefit ratios of demonstrated plots and farmers practice were alsorecordedand calculated.

3. ResultsandDiscussion

Resultsrevealedthattheincidenceof*N.lugens*waslowerinthedemonstratedplotswith 1.84nymphsoradultshill^{-1}inthevegetativestageand7.76nymphsoradultshill^{-1}inreproductivestageduring*kharif*,2018–19andwith12.18nymphsoradultshill^{-1}inthevegetativestageand 24.95nymphsoradultshill^{-1}inreproductivestageduring*kharif*,2019–20andwith19.0nymphsor

adults hill^{-1} in the vegetative stage and 52.38 nymphs or adults hill^{-1} in reproductive stage during*kharif*, 2020–21. The higher infestation was observed in farmer practices with 3.33 nymphs oradults hill^{-1} in the vegetative stage and 19.84 nymphs or adults hill^{-1} in reproductive stage during*kharif* (June–December), 2018–19 and with 35.40 nymphs or adults hill^{-1} in the vegetative stageand 50.30 nymphs or adults hill^{-1} in reproductive stage during *kharif* (June–December), 2019–20and with 25.42 nymphs or adults hill^{-1} in the vegetative stage and 63.47 nymphs or adults hill^{-1} inreproductivestageduring*kharif*(June–December),2020–21(Table1).

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The total cost ofcultivation incurred, gross and net returns & B:C ratio in this study to assessthe economic impact of technology of IPM module and farmer practice. The data in table 2 revealedthat the yield of IPM module followed plot was 7130, 5513 and 5065 kg ha^{-1} whereas in farmerpracticetheyield was 6733,4851 and 4768 kgha^{-1}during (June–December),2018–19,2019–20and2020–21 respectively.Theeconomic analysisresults revealedthatthe paddy crop recordedhighergrossincomefromIPMmodulewere₹10337,₹101981and₹88642ha^{-1}asrelatedto₹97636, ₹89744 and ₹83440 ha^{-1} in farmers practice during *kharif* (June – December), 2018–19,2019–20 and 2020–21 respectively. The B:C Ratio in IPM module was 1.88, 2.68 and 1.78 while infarmer practiceplot was 1.43, 1.94 and 1.27 during *kharif*(June– December),2018–19, 2019–20and2020–21respectively.Theresultsofthecurrentstudyareinlinewiththefindingsof Kattietal,. 2000, Sehgal et al., 2001, Samiayyan et al., 2010, Prajapati et al., 2013, Singh et al., 2017,Saravanakumar,2020,Kumaretal.,2020andBalasubramaniam,2022.IPMmoduleshownpositiveresults inrespectof yield and economics of rice. Itwas marked fromthe results thatB:CRatioofricecropinIPMmodulewashigherascomparedtofarmerpracticeinboththeyears.Becauseofnon-adoption ofIPM module for brown planthopper

management in rice crop resultedin lower B:C Ratio in farmer practice. Thus, promising B:C Ratio and higher net returns in IPMmoduleshowedtheeconomicsustainabilityofthedemonstratedtechnologyandi nfluencedthefarmers on theutility of technology provided at actual farming situation. Therefore,it is concludedthat the technology demonstrated treatments can be recommended in large scale to manage brownplanthoppersinricefieldsinensuingcroppingseasons(Table2).

Table1:Brownplanthoppersincidenceinrelationwithweatherduring*kharif*,2018–19,2019–20and2020–21

Month	AveragePopulationHill^{-1}						MeteorologicalObservation								
	2018–19		2019–20		2020–21		Temperature°C (Max.)			Temperature°C (Min.)			Rainfall(mm)		
	De	Farm	De	Farm	De	Farme	2018–	2019–	2020–	2018–	2019–	2020–	2018–	2019–	202

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	mo	er's Practice	mo	er's Practice	mo	r's Practice	19	20	21	19	20	21	19	20	0–21
Vegetative Period	1.84	3.33	12.18	35.40	19.00	25.42	31.3	30.6	30.3	23.1	23.4	30.6	3467	379.	263.8
Reproductive Period	7.76	19.84	24.95	50.30	52.38	63.47	32.0	30.4	30.2	17.8	18.5	18.2	12.12	44.1	35.9

Vegetativeperiod(August–September)andReproductivePeriod(October–December)

Table2:Economicimpactofexperimentduring*kharif*(June–December),2018–19,2019–20and202

Particulars	Yield(Kgha^{-1})			Percentincreaseinyieldover check(%)			Costofcultivation (₹ha^{-1})			Grossreturns(₹ha^{-1})			B:CRatio		
	2018–19	2019–20	2020–21	2018–19	2019–20	2020–21	2018–19	2019–20	2020–21	2018–19	2019–20	2020–21	2018–19	2019–20	2020–21
IPM module	7130	5513	5065	5.88	13.64	6.22	54950	38068	49915	103378	101981	88642	1.88	2.68	1.78
Farmer practice	6733	4851	4768	-	-	-	68238	46353	65653	97636	89744	83440	1.43	1.94	1.27

Comment [I12]: improve the tables as they cannot be placed like this in the article. very big names and little space

4. Conclusion

InIPMmodule,documentedhigherpaddyyieldwithnetreturnsof₹48428,₹63913 and₹38727ha^{-1}whichwasabout5.88%,13.64%and6.22%withcorrespondingB:Cratiosof1.88, 2.68 and 1.78 higher than thenon IPMmodule with ₹29398,₹43391 and ₹17787 ha^{-1} during*kharif*,2018–192019–20and2020-21respectively.TheIPMbasedpracticeswerefoundeffective in comparison to farmer practice. From the above study, it can be concluded that byadopting IPM based brown plant hopper management strategies in in can be efficiently managedinsteadofpracticingchemicalcontrolmeasurealone.

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