Efficacy ofChemicalsand Bio-Pesticides againstMustardAphid, *Lipaphiserysimi*(Kalt.) on Mustard

Originalresearcharticle

ABSTRACT

Thepresentinvestigationwas conducteddur*ing rabi*seasonof 2023-2024atCropResearchfarm, NAI,SHUATS,PrayagrajusingRandomizedBlockDesign(RBD)methodandeighttreatmentsare replicatedthrice.Results revealedthat,amongallthetreatments Imidacloprid17.8SLrecorded lowestpopulationofaphid(55.67),followedbySpinosad45%SC(66.51),Cypermethrin10% EC (78.55), Sixer plus(94.49),NiscoMECH333(96.17),Neemoil5%(99.44),and*Beauveria bassiana*(109.90)waslesseffectiveamong allthetreatments.While,thehighest yieldandcost benefitratiowasobtainedwithImidacloprid17.8SL(18.15q/ha.),(1:5.20)FollowedbySpinosad 45%SC(17.85q/ha.),(1:4.78),Cypermethrin10%EC(16.35q/ha.),(1:4.54),Sixerplus(14.98 q/ha.),(1:4.18),NiscoMECH 333(14.58q/ha.),(1:4.08),Neemoil5%(13.03q/ha.),(1:3.61), *Beauveria bassiana*(12.55q/ha.),(1:3.48)Leastmonetaryreturnwasobtainedwithcontrol(9.17 q/ha.),(1:2.74).

Keywords:Fieldefficacy;imidacloprid;insecticides;Lipaphiserysimi;mustard.

1. INTRODUCTION

Theterm"mustard"originally referredtoacondiment andwasderivedfromtheLatin word"mustum". Mustard,*Brassicajuncea*(L.)AsignificantoilseedcropintheCruciferae (alsoknownasthe Brassicaceae)familyisczernandcoss.BrownmustardorIndianmustardhaschromosomalnumber (2n=36).(Senand Kumar2023)

“Mustardisalsorichinmineralslikecalcium,manganese,copper,iron,selenium,zinc,andvitamins(A, B,andC),aswellasproteins.In1000gramsofmustardseeds,thereare508kilocalories ofenergy, 28.09gramsofcarbohydrates, 26.08gramsofproteins,26.08gramsoftotalfat,and12.2gramsof dietaryfiber.Additionally,itcontains31InternationalUnits(I.U.)ofVitaminA,4.733milligramsofniacin, 7.1milligrams ofVitaminC,266milligrams ofcalcium,9.21milligrams ofiron,370milligrams of magnesium,13milligramsofsodium,and738milligramsofpotassium”(Dharavath*etal.,*2016).

“India ranks world’sthirdimportantoil cropinterms ofproductionandarea. itisoneofthethreemajor oilseedscropsalongwithgroundnutandsoybeancontributingaround25 per cent ofthetotaloilseeds production”.(Sen*etal.,* 2017).

*“Lipaphiserysimi*belongstothefamilyAphididae andiscommonlyknownasmustardaphid.Itisa cosmopolitaninsectfoundonboththeleafsurfacesandinleaffoldsofdevelopingheads,onleafstalks, andonleafaxles.Theyareprimarilyfoundonthegrowingpointsofthehostplants,including tips, flowers,anddeveloping pods,andcoverthewholeplantwithhighdensity.Theysucksapfromthe hosts,andinfestedplantsbecomestuntedanddistorted”.(Sharma*etal.,*2020).

Newerinsecticidemoleculesareabetteralternativetoconventionalsyntheticinsecticidesinthecontext ofenvironmentallybenignmanagementtactics.Theyalsohelpmitigateadverseeffectsonthetotal

environment.Inmanycases,alternateoreco-friendlymethods ofinsectmanagementofferadequate levelsofpestcontrolwithfewerhazardsandgreatersafetytonon-targetorganisms.

2. MATERIALSANDMETHODS

Theexperimentwasconductedattheexperimental researchplotoftheDepartmentofEntomology, CentralResearchFarm, SamHigginbottomUniversityof AgricultureTechnologyandSciences,during therabiseasonof2023-2024. Itfollowedarandomized blockdesignwitheighttreatmentsreplicated threetimes.VarietyKalaSonaseeds were used inaplotsize of 2m×1mataspacingof15cm×20cm, followingarecommended packageofpracticesexcludingplantprotection. Thetreatmentsincluded: NiscoMech333@5ml/lit.,Spinosad45%SC@0.3ml/lit.,Cypermethrin 10%EC@1.2ml/lit.,Sixer plus@5ml/lit., Imidacloprid17.8SL@1ml/2.5lit.,Neemoil5%@5ml/lit.,*Beauveriabassiana*1.15WP @5gm/lit.

Theobservations onthepopulationofmustardaphidwererecordedvisuallyusingamagnifyinglens andpaperforcountingthepopulation ofaphids. Thiswasdoneearlyonthetop10cmofthecentral apicaltwig perplant from five randomlyselectedplants.Thepopulationofaphidswas recordedinthe fieldonthefive randomlyselectedplants fromeachplotonedaybeforespraying andonthe3rd,7th, and14thdaysafteronesprayofinsecticides.Thedatawasthenstatisticallyanalyzed.

3.RESULTSANDDISCUSSION

Theresults(Table-1)aftersprayrevealedthatallthetreatmentsweresignificantlysuperiorovercontrol. Amongallthetreatments,minimuminfestationofaphidwasrecordedinSpinosad45%SC(66.51)which waslowerthanthechecktreatmentImidacloprid 17.8SL(55.67)followedbyCypermethrin10%EC (78.54),Sixerplus(94.49), NiscoMech333(96.17),andNeemoil5%(99.44)Theleasteffective treatmentswas*Beauveriabassiana*(109.90).Maximuminfestationwasrecordedincontrol(241.87).

Thehighestyieldandcost-benefitratiowereobtainedwithImidacloprid17.8SL(18.15q/ha),(1:5.20), followedbySpinosad45%SC(17.85q/ha),(1:4.78),Cypermethrin 10%EC(16.35q/ha),(1:4.54), SixerPlus(14.98q/ha),(1:4.18),Nisco MECH333(14.58q/ha),(1:4.08), Neemoil5%(13.03q/ha), (1:3.61),*Beauveriabassiana*(12.55q/ha),(1:3.48),andthecontrolplot(9.17q/ha),(1:2.74)

Thedataonthemeanaphidpopulationaftersprayin Imidacloprid17.8SL were(55.67)Theseresults weresupportedby Dotasara*etal*.,(2017),Pippal*etal*.,(2022)andRaju andTayde(2022).Spinosad 45%SCwasalsofoundtobenexteffective(66.51).Theresultswerealsoobserved byAktar*etal*., (2021)andSairamandKumar(2022)Cypermethrin 10%ECwere(78.55).Similarfindingswere observedbyBhatta*etal*.,(2019)andSreejaandKumar(2022).NiscoMech333was(96.17)isfoundto benexteffectivetreatmentwhichis in linewiththefindingsof SairamandKumar(2022).

Thecostbenefitratiorangedbetween1:5.20and1:2.74.Maximumcostbenefitratio(1:5.20)andyield (18.15q/ha)wasobtainedinImidacloprid 17.8SLtreatedplots,whichissupportedbySaitejaand Tayde (2022)andSenandKumar (2023)and,followedbySpinosad 45SCwithcostbenefitratio (1:4.78)andyield(17.85q/ha),andtheresultsweresimilartothefindingsofSairamandKumar(2022). Cypermethrin10% ECalsohada profitableyieldof(16.35q/ha)andcostbenefitratio(1:4.54)linedto SreejaandKumar(2022).

Table1. Efficacyofselectedchemicalsandbiopesticidesontheincidenceofmustardaphid,*Lipaphiserysimi*(Kaltenbach)during*rabi*Season 2023-2024(1st spray)

S. No.	Nameoftreatments	Dosages	Populationofmustard aphid/top10cmcentral twig of plant (Daybeforespraying)	Mean populationofmustardaphid /top 10cmcentraltwigofplant 3rdDAS	7thDAS	14thDAS	Mean	Yield (q./ha.)	Costbenefitratio (C:B)
T_0	Control	-	238	239.2	241.33	245.07	241.87	9.17	1:2.74
T_1	NiscoMech333	5ml/lit.	256.13	175.5	71.40	41.60	96.17	14.58	1:4.08
T_2	Spinosad 45% SC	0.3ml/lit.	243.13	128.2	49.87	21.47	66.51	17.85	1:4.78
T_3	Cypermethrin 10% EC	1.2ml/lit	268.73	154.50	55.47	25.67	78.55	16.35	1:4.54
T_4	SixerPlus	5ml/lit	251.87	173.40	67.73	42.33	94.49	14.98	1:4.18
T_5	Imidacloprid17.8SL	1ml/2.5lit	254.67	113.60	41.40	12.00	55.67	18.15	1:5.20
T_6	Neemoil5%	5ml/lit.	247.47	177.60	77.80	42.93	99.44	13.03	1:3.61
T_7	*Beauveriabassiana* 1.15WP	5gm/lit	245.73	196.78	85.80	47.67	109.90	12.55	1:3.48
Overallmean		-		169.83	86.35	59.84	105.32		
F- test		NS		S	S	S	S		
SE.d(±)		-		2.56	2.20	1.67	21.02		
C.D.(P= 0.05)		-		5.488	4.717	3.577	45.091		

DAS-DayAfter SprayNS*-Non-SignificantS*- Significant*

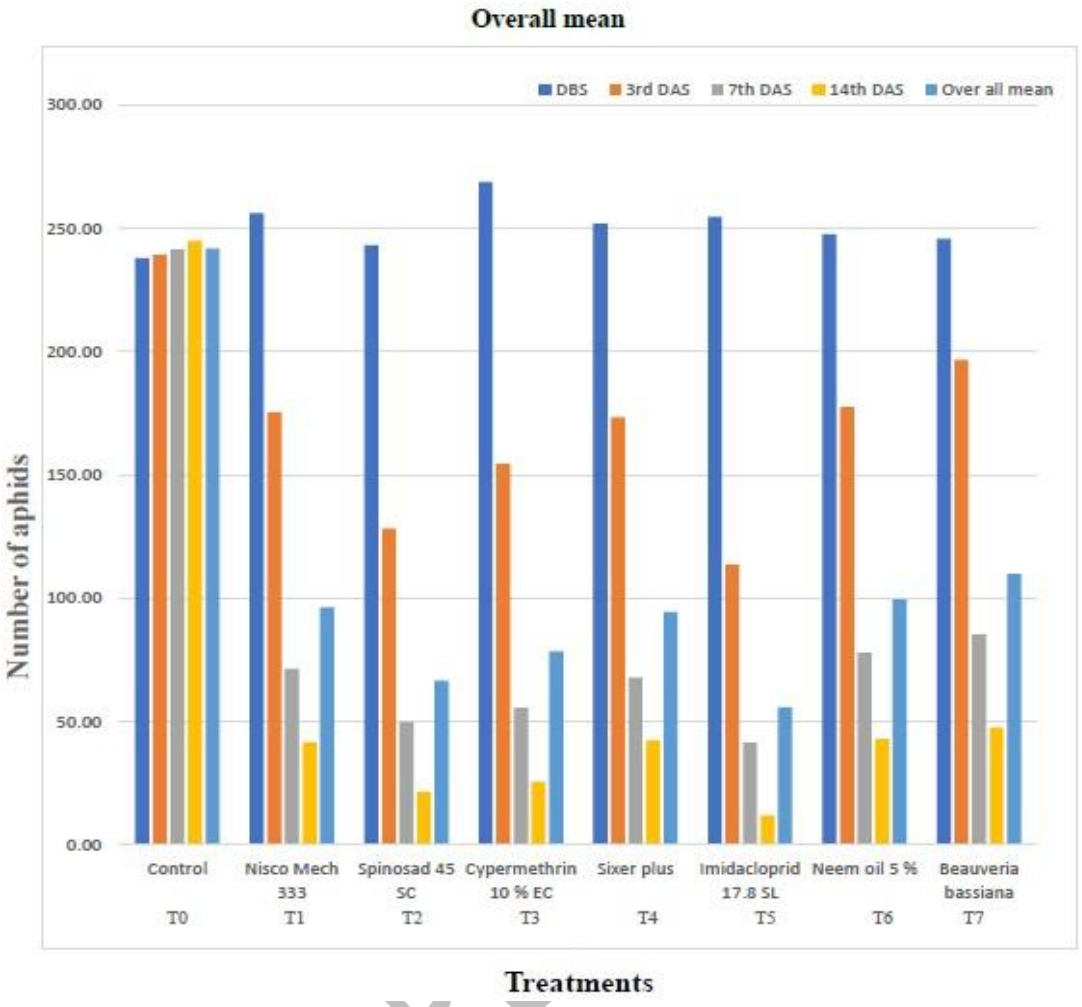

Fig.1.Efficacyofselectedchemicalsandbiopesticidesagainstmustardaphid,*Lipaphiserysimi* (Kaltenbach)

Fromtheabovediscussion, itwasfoundthatsprayinginsecticidessignificantlyreducedthemustard aphidpopulationonmustard. Thepresentfindingsconcludethatthenewgeneration insecticideslike T_1NiscoMech333,T_2Spinosad45%SC,T_3Cypermethrin10%EC,T_4SixerPlus,T_5Imidacloprid17.8 SL,T_6Neemoil5%,T_7*Beauveriabassiana*1.15WP.T_4Spinosadwasfoundeffectiveagainst*Lipaphis erysimi*alongwithanadditional yieldlevelinmustard, whichwaslowerthanmychecktreatment Imidacloprid17.8SL.Further,itwasobservedthatthecost-benefitratiowasalsohighwithImidacloprid 17.8 SL andSpinosad45% SC.

Conclusion

Based on the finding of this study, Itissuggestedthateffectiveinsecticidesmaybealternatedin harmonywiththeexistingIntegratedPestManagement programstoavoidissuesassociatedwith insecticidalresistance,pestresurgence,etc.

REFERENCES

Bhatta,K.,Chaulagain, L.,Kafle,K.andShrestha, J.(2019).Bio-Efficacy ofPlantExtractsagainst MustardAphid(*Lipaphiserysimi* Kalt.)onRapeseed(*Brassicacampestris*Linn.)under Fieldand LaboratoryConditions.*SyrianJournalofAgriculturalResearch*,6(4):557-566.

Dharavat, N.,Mehera,B.,Nath,S.,Patra,S.S.andRout,S.(2016). Effectofsowingdateson population dynamicsofmustardaphid(*Lipaphiserysimi*)inmustard(*brassicajuncea*)under Allahabadclimaticcondition.*AdvancesinLife Sciences,*5(20):2278-3849.

Dotasara, S.K.,Agrawal,N.,Singh, N.,andSwami,D.(2017).Efficacyofsomenewerinsecticides againstmustardaphid*Lipaphiserysimi*Kalt.incauliflower.*Journalofentomology andzoology studies*,5(2):654-656.

Pippal,S.S.,Sharma,M.L.,Jatav,P.K.andMahore,P.(2022).Efficacyofnewerinsecticidesagainst

mustardaphid*Lipaphiserysimi*(Kalt.).*ThePharmaInnovationJournal*,11(7):1070-1074.
Raju,C.E.P.andTayde,A.R.(2022).FieldEvaluationofSelectedInsecticidesandBotanicalagainst MustardAphid*,Lipaphiserysimi*(Kalt.)onMustard,*Brassicajuncea*L.*International Journalof PlantandSoil Science*,34(22):1188-1193.
Sairam,B. andKumar,A. (2022).Fieldefficacyofselectedbiopesticidesandfipronilagainstmustard aphid,*Lipaphiserysimi*(Kalt.).*ThePharmaInnovationJournal*,11(8):1640-1644.
Saiteja,K.,andTayde,A.R.(2022).EfficacyofChemicalInsecticidesandNeemProductsagainst MustardAphid[*Lipaphiserysimi*(Kalt.)]onMustard*Brassica juncea*(L.).*InternationalJournalof PlantandSoilScience*,34(22):1118-1122.
Sen,M.K.andKumar,A.(2023).ComparativeEfficacyandEconomicsofBiopesticides and ImidaclopridagainstMustardAphid[*Lipaphiserysimi*(Kalt.)]Hemiptera:Aphididae)*International Journalof Plantand SoilScience*,35(14):201-208.
Sen,K.,Samanta, A.,Hansda,A.,Dhar,P.P.andSamanta, A.(2017).Bioefficacyandeconomics of someinsecticides againstmustardaphid,*Lipaphiserysimi*(Kalt.)infesting mustard.*Journalof CropandWeed,*13(2):235-237.
Sreeja,S.andKumar,A.(2022).Fieldefficacyofselectedchemicalsandbiopesticidesagainstmustard aphid[*Lipaphiserysimi*(Kaltenbach)] onmustard[*Brassicajuncea*(L.)]atPrayagraj (U.P.), *Journalofthepharmainnovation,*11(5):1706-1710.
Sharma,N.,Upadhyaya,S.N.,Singh,U.C.,Dubey,M.andAhmad,A.(2020).Bioefficacyof insecticidesagainstmustardaphid.*JournalofEntomologyandZoologyStudies*,8(4):97-102.