

Insect Diversity Study on Shallot Plants with Ecological Engineering in Nganjuk District

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ABSTRACT

*This study examines the cultivation of shallots (*Allium ascalonicum* L.) using an ecological engineering approach in Nganjuk Regency, Indonesia, to enhance insect diversity and natural pest control. The applied methods include compost application, refugia planting, and the use of biological agents to reduce synthetic pesticide dependence. The study compares two management systems: ecological engineering farmland (A) and conventional farmland (B), with insect data collected using various trapping methods. The results show that ecological engineering farmland had a higher insect population (23,428 individuals) compared to conventional farmland (14,880 individuals). A total of 181 morphospecies from 10 orders, 85 families, and 170 genera were identified, with Coleoptera being the dominant order and predatory insects prevailing in both farmlands. The diversity index was higher in ecological engineering farmland (3.079) than in conventional farmland (2.725). The evenness index was also higher in ecological engineering farmland (0.608–0.624) than in conventional farmland (0.561–0.603), indicating a more stable ecosystem. The dominance index was low in both farmlands (0.003–0.188), showing no single species significantly dominated. The community similarity index was relatively high at 0.666 (vegetative), 0.651 (generative), and 0.712 (one growing season). Although the t-test showed no significant differences, ecological engineering farmland tends supports more sustainable shallot farming by enhancing biodiversity and ecosystem stability. Further research is needed to evaluate long-term impacts and the implementation of polyculture systems to strengthen agricultural ecosystems.*

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1. PHOTOGRAPHIC DOCUMENTATION OF INSECTS

This section presents visual documentation of various insect species observed in shallot cultivation areas.

HERBIVOROUS INSECTS



Longitarsus. linnaei



Phyllotreta sp.



Psylliodes sp.



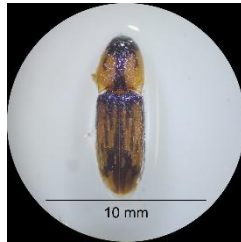
Altica sp.



Baris sp.



Sitophilus oryzae



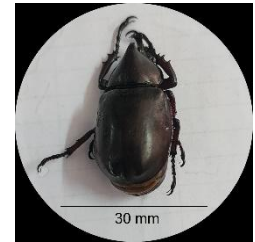
Conoderus sp01



Conoderus sp02



Holotrichia sp.



Oryctes rhinoceros



Xylosandrus sp.



Palorus subdepressus



Tribolium sp.



Liriomyza chinensis



Ophiomyia sp.



Orseolia sp.



Drosophila sp.



Hydrellia sp.



Atherigona sp.



Bradysia ocellaris



Leptocoris acuta



Aphis gossypii



Balclutha sp.



Cicadella viridis



Cicadulina bipunctata



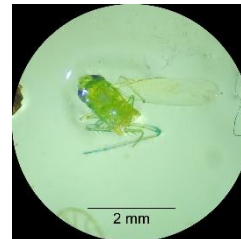
Cofana spectra



Dalbulus sp.



Deltocephalus sp.



Empoasca sp.



Idiocerus niveosparus



Idioscopus sp.



Macrosteles sp.



Maestas dorsalis



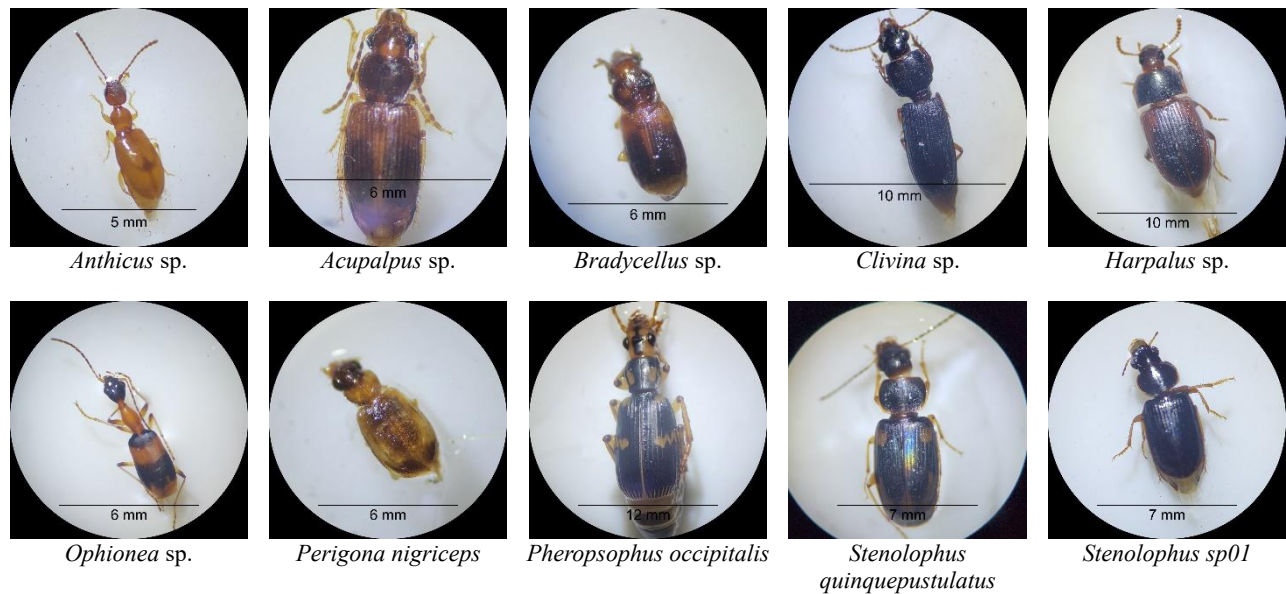
Nephotettix sp.



Gonocerus sp.



PREDATORY INSECTS





Stenolophus sp02



Tachys sp01



Tachys sp01



Tachyura sp.



Myriochila specularis



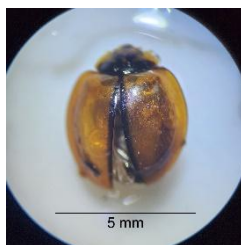
Coccinella transversalis



Harmonia octomaculata



Menochilus sexmaculatus



Micraspis discolor



Scymnus sp.



Stethorus sp.



Verania lineata



Agabus sp.



Hydroglyphus geminus



Hydroglyphus sp01



Hydroporus sp.



Hydrovatus subtilis



Laccophilus sp.



Neobidessus sp.



Berosus sp01



Berosus sp02



Enochrus sp.



Helobata sp.



Paracymus sp.



Attalus sp.



Astenus sp.



Atheta sp.



Lathrobium sp.

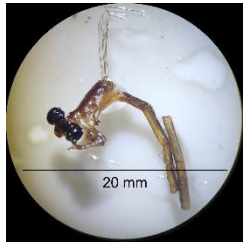


Oligota sp.



Paederus fuscipes





Agriocnemis pygmaea



Gryllus sp.



Gryllodes sp.



Xya sp.

PARASITOID INSECTS



Tomosvaryella sp.



Sarcophaga carnaria



Sepedon, sp.



Argyrophyllax sp.



Besseria sp.



Cephalonomia sp.



Apanteles sp.



Cotesia sp.



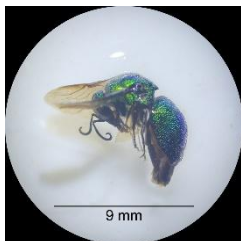
Fopius arinus



Macrosentrus sp.



Opius sp.



Stilbum cyanurum



Entomacis platypes



Ophelimus sp.



Helorus sp.



Ophion sp.



Xanthocryptus sp.



Anaphes sp.



Gonatocerus sp.



Anisopteromalus calandrae



Scelio sp.

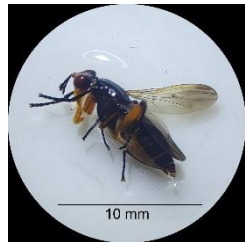


Telenomus sp.



Tiphia sp.

POLLINATORS



Chalcosyrphus sp.



Tabanus sp.



Lasioglossum sp.



Sceliphron sp.



Allorhynchium
argentatum



Eumenes sp.



Amata huebneri

DECOMPOSER INSECTS



Xyleborus sp.



Indalmus hirsutus



Heterocerus sp.



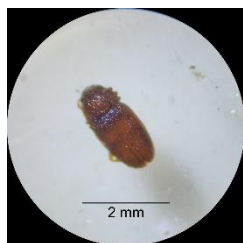
Laccobius bipunctatus



Agathidium sp.



Pseudotriphyllus colchilus



Typhaea stecorea



Neohydrocoptus
subvittulus



Stilbus sp.



Ataenius sp.



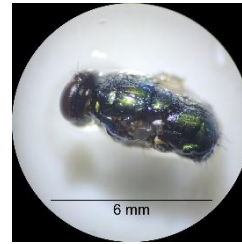
Onthopagus sp.



Phloeonomus sp.



Calliphora sp.



Lucilia sericata



Chironomus sp.



Critocopus sp.



Scatella sp.



Elaphropeza sp.



Fannia sp.



Musca domestica



Muscina sp.



Dorniphora sp.



Megaselia sp.



Fam : Piophilidae
(unknown genus)



Psectrosciara sp.



Oligotoma sp.

NEUTRAL INSECTS



Culicoides sp.



Culex sp.