Tapinoma sessile nd its Preference for Sour, Sweet, Bitter, nd S lty Solutions

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ABSTRACT

Tapinoma sessile is a common ant species that often nests in close proximity to human structures and food sources which often leads to conflict. This study investigated if ants exhibited preferential forage selection for sweet (sugary) foods when compared to bitter, sour, and salty solutions. Ants were placed in terrariums and induced to choose food sources. Selection was indicated by the mass harvested. Ants showed a high preference for sweet foods when compared to the other foods and the control (water). These findings are significant as they showed that ant preference for sugary foods is high enough to perhaps use sugar to lure ants away from crops.

INTRODUCTION

Selecting for ge is cruci l choice f cing n individu l in its quest for surviv l Individu ls choose etween foods th t v ry in und nce, ccessi ility, p l t ility, nd nutrition l v lue Selecting opti l for ge, c n le d to high energy int ke, he lthier individu l, higher fitness, nd incre sed reproductive fitness Pyke *et al* Su opti l selection c n le d to low energy int ke, poor he lth, low reproductive fitness nd de th These consequences re severe enough th t for ge selection is not r ndo nd represents n evolution ry derived surviv l str tegy Pyke *et al.*

This study deter ines the for ging preference of co on, n tive species of nt, the odorous nt *Tapinoma sessile),* y e suring its preference etween sweet, s lty, sour, nd itter solutions *T. sessile*

B r ni Buczkowski nd Bennett . *T. sessile* h s lso een o served for ging on sug ry pl nt secretions such s phloe nd nect r B r ni Buczkowski nd Bennett . Sug r is detected che ic lly y p ir of ntenn e loc ted on the nts he d Ricks nd Vinson . Preference y e due to the f ct th t this species of nt is un le to digest solid food Digestion occurs when digestive enzy es re e creted onto food sources nd the liquid is ingested Ricks nd Vinson . Sug r's high energy content, e se of digestion, nd ne r liquid n ture honeydew kes it n opti l choice for species with digestive syste un le to ingest solid foods

This study will test the hypothesis th t nts will prefer sweet solutions, tching their o served *in situ* preference B r ni Buczkowski nd Bennett . Pr ctic l pplic tions of these results will include str tegies to li it the degree of d ge nts inflict on crops world wide Cherrett nd Peregrine Morrison *et al.* Agr w l Dyer *et al.* .

METHODS

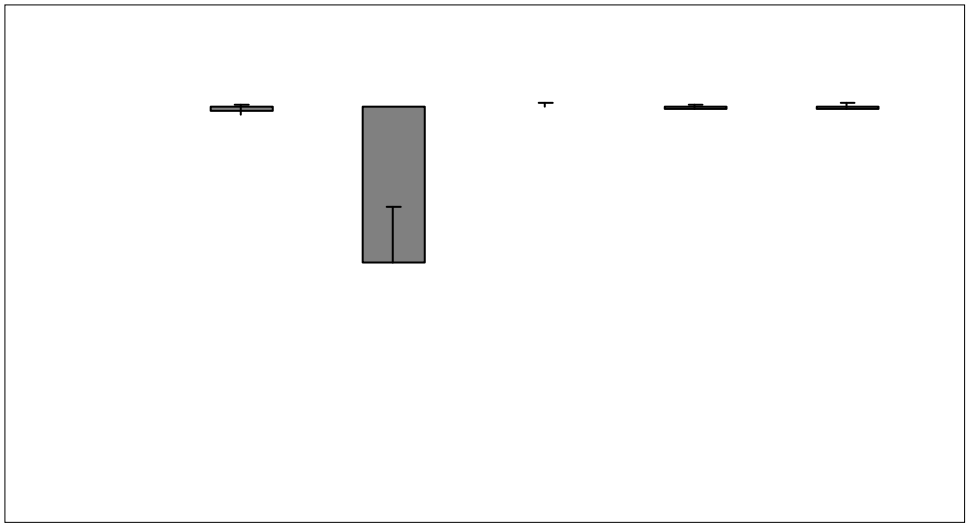
Four solutions were prep red for this study Bitter g of ground N o Coffee e ns in l of deionized w ter, sour gr s of citric cid in l of deionized w ter, s lty gr s of sodiu chloride in l of deionized w ter, nd sweet gr s of sucrose in l of deionized w ter The fifth control solution w s l of deionized w ter Mig o .

Five c squ res of re d were cut fro single piece of white re d drops or l of the itter solution w s pl ced on e ch side of the five re d squ res These squ res were weighed nd the initi l ss recorded t roo te per ture The squ res were then pl ced in corner of covered pre de terr riu to reduce ev por tive w ter loss This procedure w s then repe ted for the other solutions until e ch terr riu h d five re d squ res present E ch

terr riu h d single colony with ppro⁄i tely nts The nts were given free ccess to the squ res for hours At this ti e, the loc tion of the re d w s switched to ensure no side i s e⁄isted Mig o ◥◢ After hours the re d squ res were weighed nd the fin l weight w s su tr cted y the initi l weight This e⁄peri ent w s repe ted ten ti es nd e ns nd st nd rd devi tions were c lcul ted for this e⁄peri ent Mig o ◥◢

RESULTS

Over ll the nts only showed preference for the sweet solution In f ct the only solution th t initi ted ny re l for ging ctivity w s the sweet solution Figure ◢ Co p red to the control the sweet solution lost g ore, itter lost g ore, sour lost ore, nd s lty lost g less th n the control



Ants prefer sug r s it is und nt, e sy to store, provides high levels of energy, nd is e sy to digest ent *et al.* 9 E se of digestion y e cruci lly i port nt for nts, s they re un le to digest solid its of food They e xcrete digestive enzy es onto foods nd consu e the se i liquid food p rticles Ricks nd Vinson Sug r's e se of digestion nd often liquid n ture nect r, honey due, pl nt fluids kes it n opti l choice for species un le to digest solid food

It is uncle r why the other sources of food were voided Ants c n sense these types of odors s they follow phero one tr ils nd loc te food sources cont ining these odors Fielde 9 L G len 999 Ant preference for sug ry foods y h ve resulted in void nce of other food sources until sug r w s co pletely consu ed Future studies could test this y e xtending the dur tion of the e xperi ent to deter ine wh t is selected fter sug r is depleted

Culver nd Be ttie 9 nd Fellers 9 9 reported th t nt for ge preference is v ri le te por lly Repe ting this study t other te por l sc les would deter ine is sug r preference is consistent Another v ri le not controlled for w s colony structure A new, r pidly growing colony will h ve different nutrition l needs when co p red to st tic colony ore concerned with inten nce nd rep ir The ge of the nt colonies w s unknown nd not unifor ongst ll repetitions lotz nd Reid 99 reported th t nts use oth structur l nd light cues to n vig te to food sources As not ll terr riu s were the s e nd e ch one w s e xposed to slightly different light conditions so e terr riu s y h ve presented e sier to n vig te l ndsc pes F ilure to control these v ri les y h ve ttri uted to the l rge st nd rd devi tion o served in the sweet d t

Ants h ve een reported to ste l nect r nd pollen fro nu erous species of pl nts nd not tr nsfer pollen etween individu ls reducing pollin tion, reproduction nd fruit production

G len 999 G len nd Cu . Ants lso consu e pl nt teri l nd c use e xtensive crop d ge v lued t illons of doll rs world wide Cherrett nd Peregrine 9 Morrison *et al.* 99 Agr w l 99 Dyer *et al.* . The results of this study could e used to design sug r sed lures to ttr ct nts w y fro v lu le crops nd resources

This study i ed to discover if nts e xhi ited differenti l preference for sweet, itter, s lty, or sour t sting foods The hypothesis tested w s th t nts would prefer sweet foods nd the findings of this study confir ed th t The si plistic n ture of the nt digestive syste li its it to liquid food nd the e se of digestion nd often liquid n ture of sug r kes this v lu le food source A high preference for sug r in nt food c n e used to lure nts w y fro v lu le crops This study could e i proved y controlling for terr riu structure, colony ge, nd lighting conditions to i prove the ccur cy of this study Investig tion into if for ging preference is si il r for colonies of different ge, nd if preference is si il r during different ti es of the d y nd ye r would gre tly dd to the growing liter ture on nt for ge preference

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