

Pest Grasshoppers and Locusts in Central Senegal: An Agriculturist's Guide



Bay Sa Waar

Communities for Sustainable Agriculture

Acknowledgments

This book was made possible by the generous support of the American people through the United States Agency for International Development, Bureau for Humanitarian Assistance.

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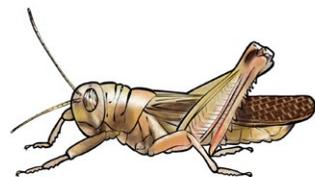
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Introduction

This booklet was created as a part of the project “Communities for Sustainable Agriculture” (Bay Sa Waar). Funded by the U.S. Agency for International Development, Bureau for Humanitarian Assistance (USAID/BHA), this project combines the specialized research skills of American, Canadian, French, and Senegalese universities and research groups with local knowledge and experience of Senegalese institutions and farmers. It is a combined effort involving the Senegalese Plant Protection Directorate (*Direction de la Protection des Végétaux*, or DPV), Université de Gaston Berger, Arizona State University’s Global Locust Initiative (ASU/GLI), McGill University, the French Agricultural Research Centre for International Development (CIRAD), and communities in rural Senegal. This project pilots novel methodologies for locust and grasshopper management in rural areas of Senegal where these pests endanger food security and wellbeing. The project’s name in Wolof, *Bay Sa Waar*, is a phrase that encourages farmers to “farm their part”—or do their part to engage in the monitoring and prevention of locusts and grasshoppers.

The original version of this booklet was distributed to project participants and partners in the Kaffrine and Fatick regions of Senegal. Written in Wolof and French, it has been translated here into English. As it was intended to serve Senegalese farmers, the original booklet was written with the assumption that the reader would be familiar with the area’s agriculture, environment, and culture. In this version of the booklet, however, we have provided a brief background on the country to contextualize the work for an international audience.

Country Overview



Senegal is the westernmost country on the African continent, spanning the Sahelian, Sudanian, and Guinean bioclimatic regions. Its unique situation permits a great variety of ecosystems, from dry steppe and short grass savannahs in the North to lush woodlands and forests in the South (CILLS 2016). A country of 15.5 million people, Senegal is divided into 15 regions, which vary in their demography, language, climate, and agriculture. GLI and its partners have worked predominantly with communities in central Senegal in the regions of Kaffrine and Fatick, where the project's first phase (2018–2020) took place.

Environment



The landscape in Sorokogne, Kaffrine region, before (left) and during (right) the rainy season.

Kaffrine and Eastern Fatick are part of Senegal's Peanut Basin, or *bassin d'arachide*, an area where peanut cultivation was first introduced by the French colonial government and expanded after Senegal's independence. Currently, agricultural parklands and savannahs dominate the landscape, with thorny shrubs and baobab trees scattered amongst cultivated fields or wild grasses (Tappan et al. 2004; CILLS 2016). During the dry season—which stretches from approximately October to May—the heat is intense, and rain scarcely falls. With the start of the rainy season around June, precipitation begins to fall intermittently, and the dry land turns green and lush. Rains persist until October, when the land returns to its parched, dusty state.

¹ Angela Khong

Agriculture



Agriculture in Senegal is primarily rainfed. Farmers in central areas plant millet either in advance of seasonal rain or after rain has started to fall around June. Millet usually matures and is ready for harvest around October.

Approximately 75% of the Senegalese workforce are farmers, the majority of whom produce crops for subsistence needs (USDA 2007). Common subsistence crops include millet, corn, and sorghum. Peanuts remain an economically important crop, especially in the Kaffrine region, the country's top producing area (Sanogo 2017). In addition to field crops, some farmers maintain orchards or small stands of mango, citrus, or cashew trees. The majority of farmers cultivate crops annually during the brief rainy season, as only 5% of agricultural land is irrigated (USDA 2007). However, some producers with access to wells cultivate garden vegetables such as tomatoes, eggplant, and lettuce throughout the year.

Ethnic Groups and Religion



Sharing meals is one aspect of Senegalese hospitality, or *teranga*. Passersby will be invited with calls of *kay lekk*, "come eat" in Wolof.

Senegal's population is made up of more than twenty ethnic groups; however, 90% of the population belongs to five major groups: Wolof (43%), Pulaar (24%), Serer (15%), Jola (5%), and Mandinka (4%) (ANSD 2013). Though ethnic groups may differ greatly in their culture, many Senegalese share values of hospitality and generosity, strong family and community ties, and religious devotion. The majority of the population practices Islam (94.5%), but the government maintains a policy of religious tolerance and celebrates both Islamic and Christian holidays (Herzog and Mui 2014).

Language and Education

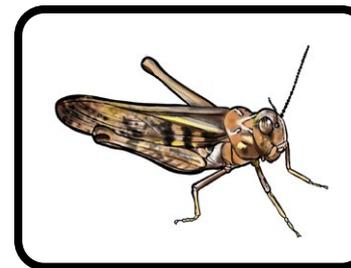
French is the official language in Senegal and the primary language of government and education. However, it is estimated that only 26% of Senegalese people are able to read and write French (Beck et al. 2018). Beyond French, the Senegalese government has designated 14 national languages, including Wolof, Serer, Pulaar, Mandinka, Soninké, and Jola, with at least 11 more in the process of achieving national status (Benson 2020). Wolof is Senegal's lingua franca—the common language connecting different linguistic groups—and is spoken by approximately 80% of Senegalese (McLaughlin 2008). In community surveys conducted prior to the project's initiation, 76% of individuals designated Wolof as their primary language. Thus, both French and Wolof were selected for our publications in order to reach the greatest percentage of people in the area, regardless of their level of education.



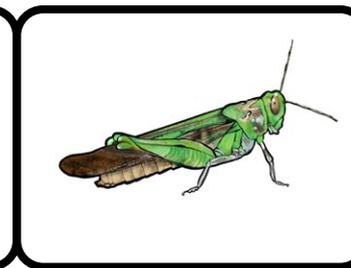
Primary school students in Tivaouane, Senegal.¹

Although school enrollment and retention rates are rising among youth, basic education rates among adults over the age of 25 are low, particularly for women. Only 31.6% of men and 13.1% of women in this age range have completed primary education. Adult literacy levels are relatively low, at 64.8% for men 39.8% for women in 2017 (World Bank 2020). Although the booklet is best understood by those who have some ability to read Wolof or French, it predominantly relies on symbols and images, which were created with feedback from project farmers.

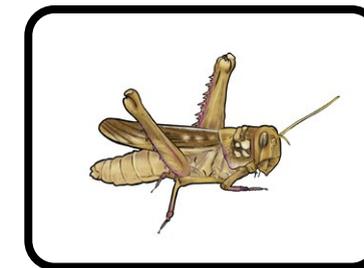
Locust and Grasshopper Diversity



Oedaleus senegalensis



Kraussaria angulifera



Diabolocatantops axillaris

The central regions of Senegal host a diversity of grasshopper species, some of which pose significant threats to agricultural production and others which are benign or even beneficial. Although rural farmers recognize that locust monitoring and management is important, they are often unable to distinguish meaningfully between species. Farmers lack an established species nomenclature in Wolof, and they may find Latin scientific names challenging to pronounce and remember, particularly if they have not benefited from formal education. To address this problem, this booklet presents relevant identifying characteristics for sixteen pest species, along with unofficial Wolof names created in collaboration with Senegalese community members, experts, and entomologists. With this work, we hope to enable rural community members to easily recall and identify pest species, thus allowing for better monitoring of locust and grasshopper populations.

Wolof Pronunciation Guide

In this booklet, we have introduced the Latin name of the species in bold italics, followed by the unofficial species names in Wolof in plain italics and their notation in the International Phonetic Alphabet (IPA) in square brackets. In addition, for those who are unfamiliar with IPA, we have included informal transcriptions in parentheses to indicate how each name sounds.

The conventions used in the informal transcriptions are described in the following notes about Wolof sounds, symbols, and transcription limitations.

Notes on informal transcriptions:

- Wolof has some regional variation in pronunciation. Our guide is for standard Senegalese Wolof, which can be spoken and understood throughout much of the country.
- The primary accent (´), or emphasis, falls on the first syllable of the words, so it is not marked.
- Periods (.) are added to separate the syllables within a word.
- Wolof contains doubled vowels, which have a longer duration than the single, or short, vowels in Wolof. The informal transcriptions, however, do not attempt to differentiate the pronunciation of the long and short vowels.
- The spelling conventions of Wolof may cause some initial confusion for English speakers. For example, **c** in Wolof represents the sound **ch** in English. The Wolof vowel **ë** is pronounced like the vowel **u** in English **bug**. In Wolof, **r** following a vowel is pronounced farther back in the mouth, much like a French **r** following a vowel. The

doubled consonants (cc, pp, gg) in Wolof are held longer than the single consonants and are followed by a brief puff of voiceless air. For example, Wolof **tipp** may sound like “tippuh.”

- Five Wolof consonants in this booklet are not present in standard English. Four are represented by **mb**, **nj**, **ny**, and **x** in the informal transcriptions. The combination **mb** is pronounced with lips together in a brief **m** sound quickly followed by a soft **b** sound to form a single consonant together. Similarly, **nj** is a combination of an **n** sound quickly followed by a soft **j** sound (as in **jelly**) to form a single consonant. The two letters **ny** together represent a sound like **ñ** in Spanish (e.g., **señor**). The letter **x** represents the voiceless guttural hissing sound at the far back of the throat like a throaty hiss of a cat. For those who don't speak Wolof as their first language, this sound can be more easily pronounced as an 'h'. In addition, the Wolof consonant **q** is transcribed as **k** although it is made farther back in the throat than English **k**.

Sound Keys

In the two sound keys that follow, we list Wolof vowels and consonants along with common Wolof words that contain them. Informal transcriptions of the words are printed in bold letters. As a guide to the transcribed sounds, common American English words and spellings that contain the sounds are printed in single quotation marks after the dash. Try sounding out the words to get a feel for the language.

Wolof Vowel Sounds Key:

a/ah	chahnt – ‘aunt’ (but not like ‘ant’)
	gah, fah – ‘awe’
	tahnk – ‘plonk’
	all – ‘all’
	dar, bar – ‘car’
ay	tay – ‘bay’
e/eh	xess – ‘mess’
	njeh – ‘meh’ (colloquial expression)
	rehr – ‘air’
ee	dee, ree, jee – ‘tea’
eu	seuw – ‘se’ + ‘oo’ (glide quickly together to make a diphthong)
i	tipp – ‘tip’
iy	biy – ‘bye’
o	nod – ‘cod’
	bop – ‘cop’
	poj – ‘lodge’
oh	soh – ‘so’
oo	soo, boo – ‘moo’
u	bugg – ‘tug’ (written Wolof ë)

Wolof Consonant Sounds Key:

ch	rooch – ‘ch’ in ‘church’ (written Wolof cc)
j	jahm – ‘j’ in ‘jeans’
k	mbok – ‘k’ (written Wolof q , far back in the throat)
mb	mbott – ‘mb’ + ‘oht’ (glide quickly together to make a single syllable)
nj	njeh – ‘nj’ in ‘ninja, quickly in succession
ny	nyah – ‘ñ’ in Spanish señor
x	xes – ‘h’ in ‘hess’ (with guttural hissing)
	xonk – ‘h’ in ‘honk’ (with guttural hissing)
y	yahm – ‘y’ in ‘yawn’

Here are selected Wolof words to practice (informal transcription in parentheses):

1. **soccet**, “grasshopper” (soh.chet)
2. **dugub**, “millet” (doo.goob)
3. **bay**, “to farm” (biy)
4. **baykat**, “farmer” (biy.cat)
5. **jambar**, “brave” (jahm.bar)
6. **yambar**, “lazy” (yahm.bar)
7. **xonq**, “red” (xonk)
8. **yaraax**, “transparent” (ya.rahx)

References

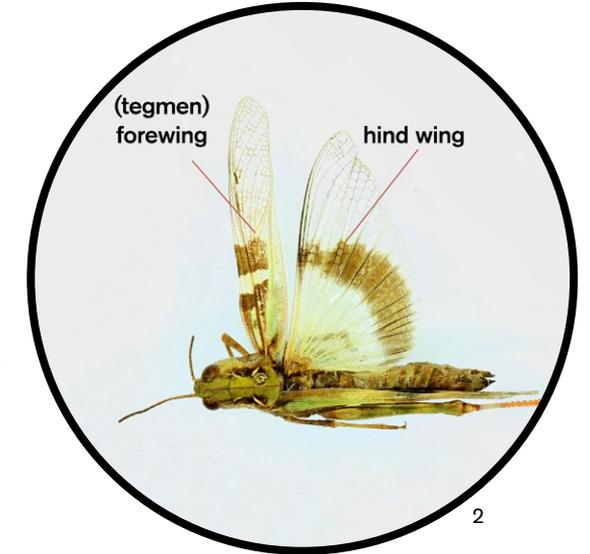
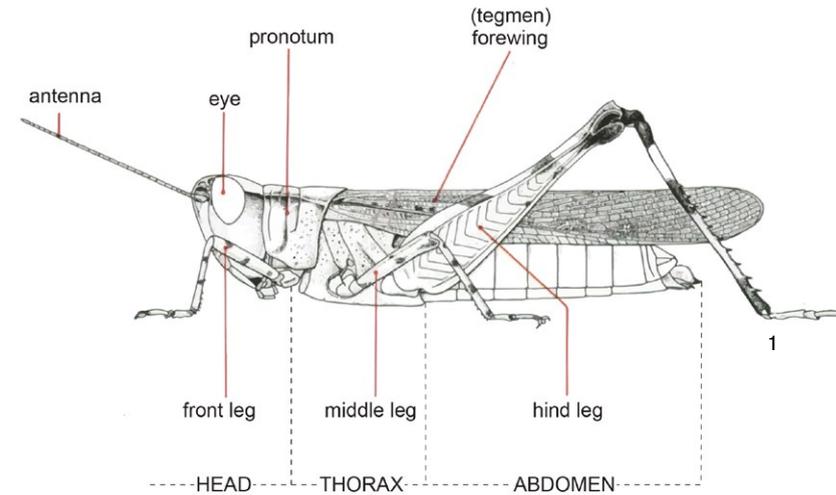
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This book was intended to complement the book *Community Management of Locusts and Grasshoppers in Central Senegal* (2020). By identifying species and tracking their activity, communities can better manage grasshopper and locust pests. All of the species described in this book are significant pests in the central regions of Senegal.



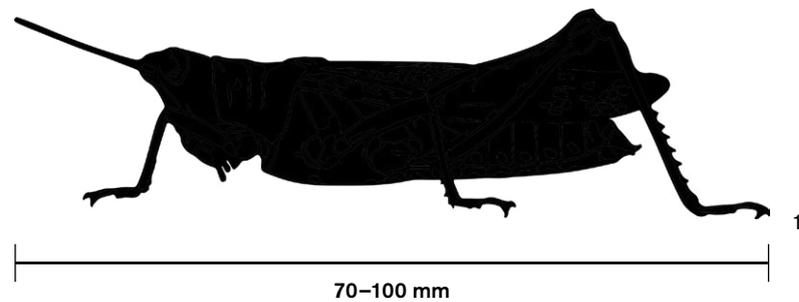
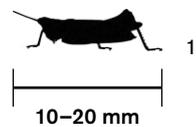
We can identify certain species on the basis of their physical characteristics, their observed diet, the environments in which they live, and the seasons in which they are observed.



Note first the appearance. Above are important parts of a grasshopper's or locust's body.

¹ Mestre J.,1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

² Priyadarsanan Dharma Rajan and Anu Radhakrishnan. CC BY 4.0. Adapted by the authors.



Their size can be variable as well.



Different types of grasshoppers and locusts eat different types of crops. For each grasshopper or locust, this booklet uses one or more symbols to indicate its diet.

Some types of grasshoppers and locusts eat grass crops, such as millet, corn, or sorghum.



Some types of grasshoppers and locusts eat tree bark and leaves, such as from mango and citrus trees.



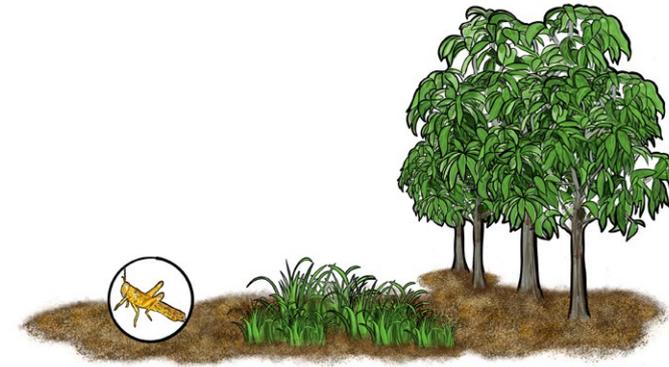
Some types of grasshoppers and locusts eat leafy crops, such as garden vegetables or peanuts.



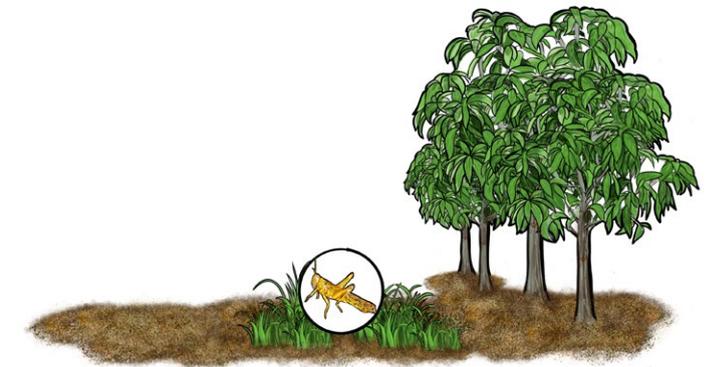
Some grasshoppers and locusts eat combinations of different types of foods.



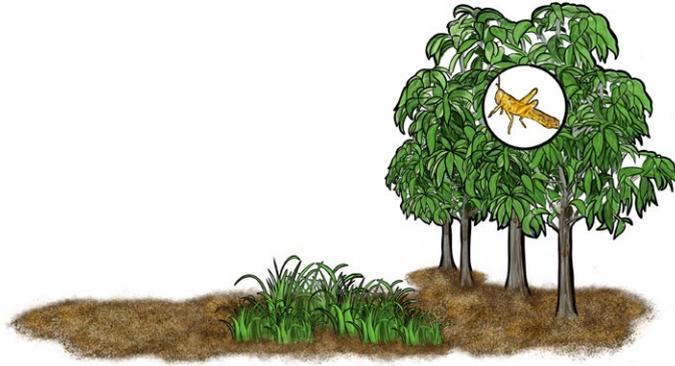
Observe where the grasshopper or locust is found. The habitat in which they are found can help to identify the species. Symbols indicating habitat will be included for each type of grasshopper.



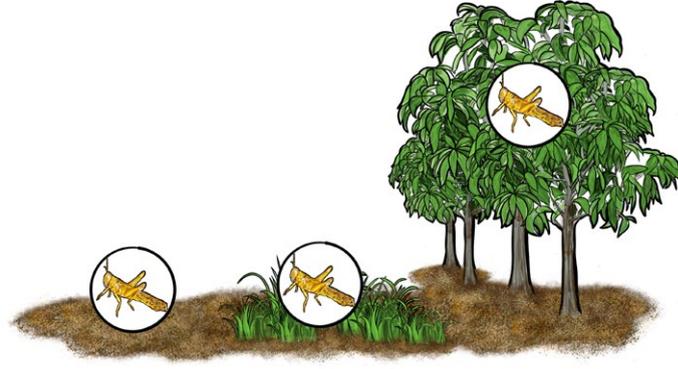
Some types of grasshoppers and locusts are found on the soil.



Some types of grasshoppers and locusts are found in the grass.



Still other types of grasshoppers and locusts are found in trees.



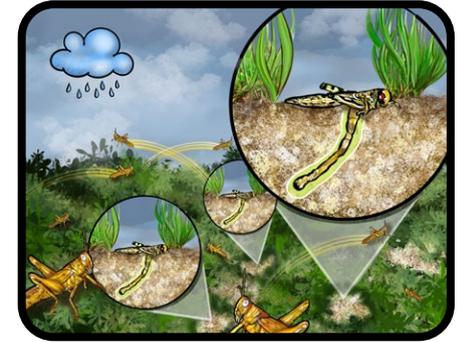
Some types of grasshoppers and locusts are found in multiple habitats.



Acrida bicolor



Dry season (November to May)



Rainy season (June to October)

It is also useful to know the season in which the grasshopper or locust reproduces. Some types of grasshoppers and locusts reproduce year-around, such as *Acrida bicolor*.



1

Oedaleus senegalensis

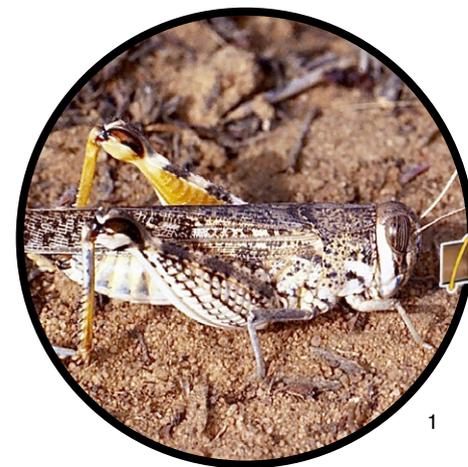


Dry season (November to May)



Rainy season (June to October)

Other types of grasshoppers and locusts, such as the Senegalese grasshopper, will reproduce during the rainy season, but the last generation of that season will not hatch. Instead, those eggs will lie dormant throughout the dry season. When the rains return, they will begin to hatch and grow.



1

Acorypha clara

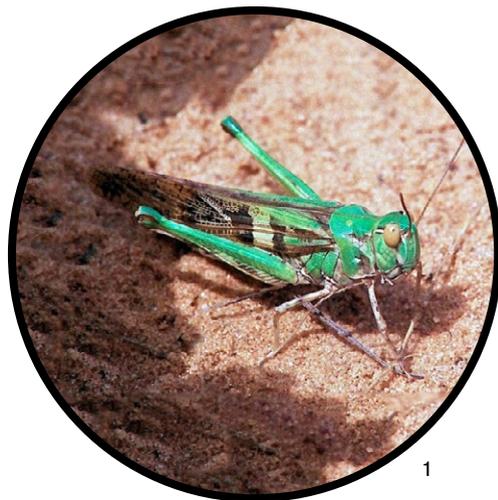


Dry season (November to May)



Rainy season (June to October)

Some types of grasshoppers and locusts will stop reproducing at the end of the rainy season. Adults are active in the dry season, but they cease to reproduce. When the next rainy season begins, they will resume reproduction.



1

Oedaleus senegalensis

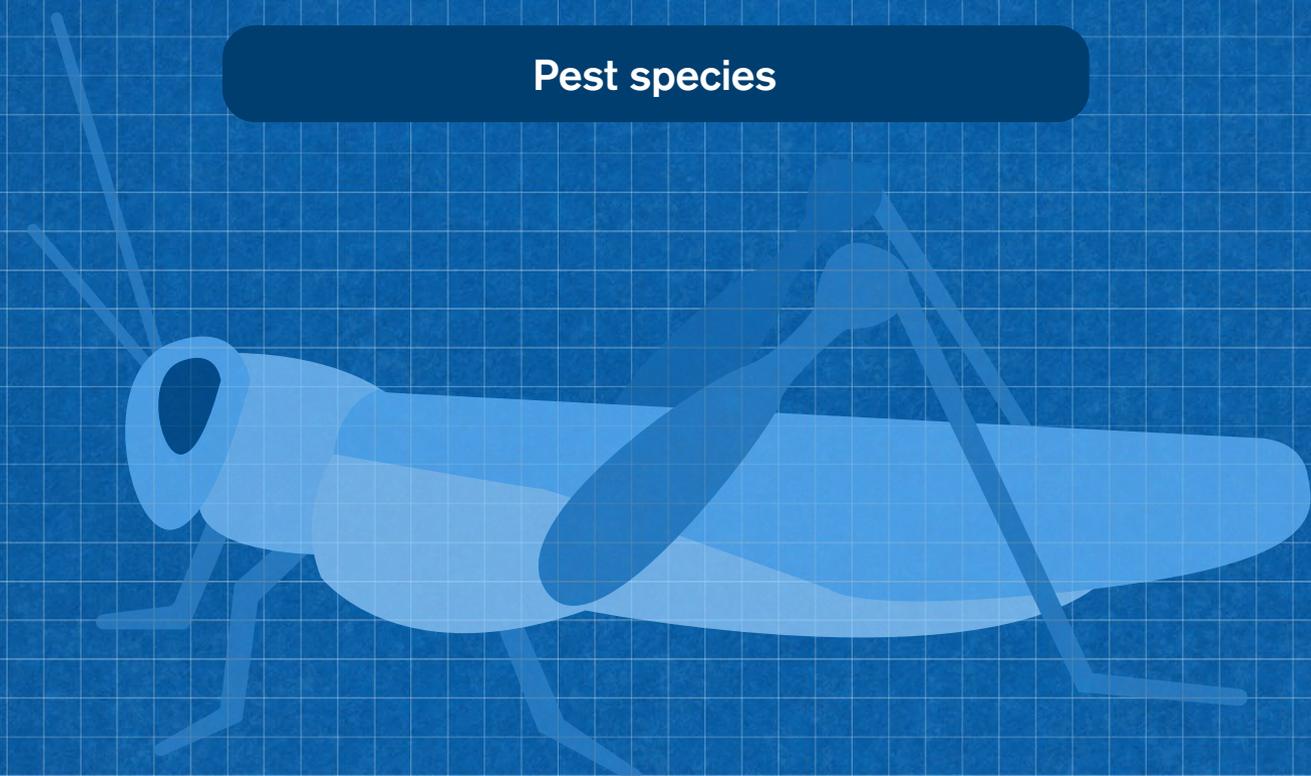


1

Oedaleus senegalensis

Some species of grasshoppers and locusts may vary in color. For example, *Oedaleus senegalensis* can be green or brown. Though the color of individuals may vary, their markings are the same.

Pest species



Acanthacris ruficornis

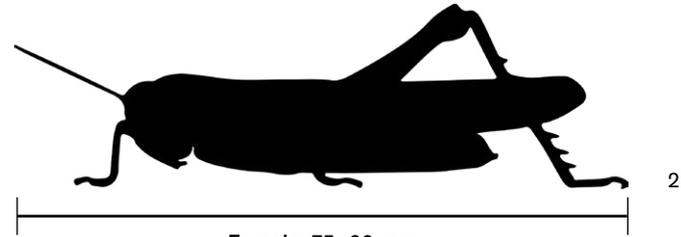


1

Acanthacris ruficornis

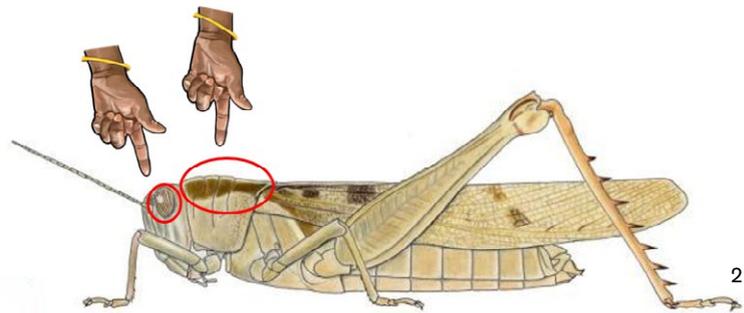
Soccet gaji
[so.tʃ:hɛt ga.ji] (soh.chet gah.jee)
"shrub grasshopper"

garden locust



2

Female: 75–90 mm
Male: 55–67 mm



2

There is a dark brown line along the side of the pronotum with several dots running up and down. The eyes are striped.

¹ Michel Lecoq

² Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Acanthacris ruficornis

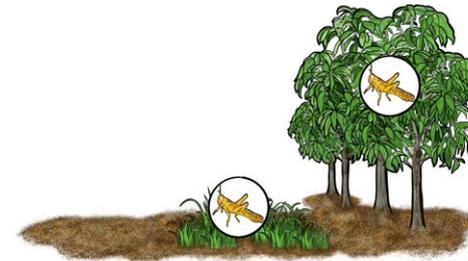
Diet



Season



Habitat



Acorypha clara

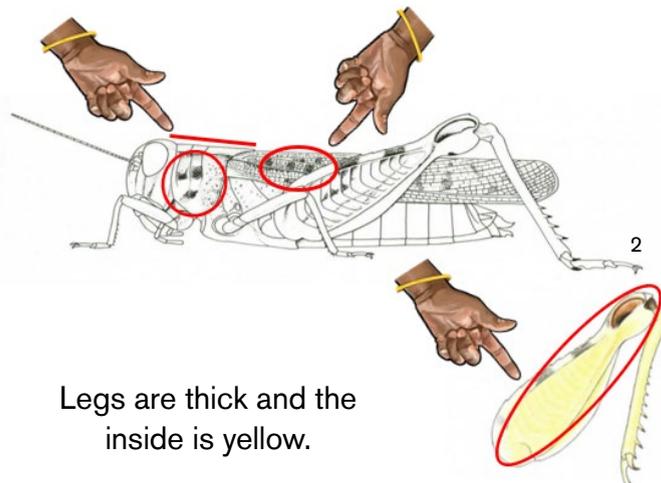


Acorypha clara

Soccet dijë pooj, mboq tank
[so.tʃiːhɛt di.je poːɟ mboq ta:nk]
(soh.chet dee.jay poj mbok tahnk)
“thick yellow-legged grasshopper”



Female: 35–42 mm
Male: 26–31 mm



Legs are thick and the
inside is yellow.

¹ Michel Lecoq

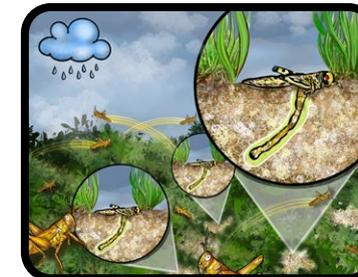
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Acorypha clara

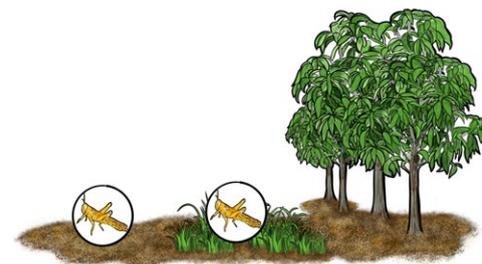
Diet



Season



Habitat



Acrida bicolor

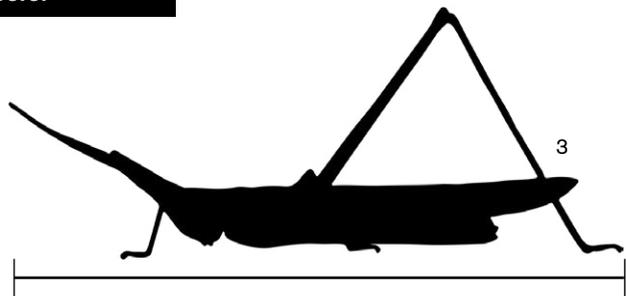


Acrida bicolor

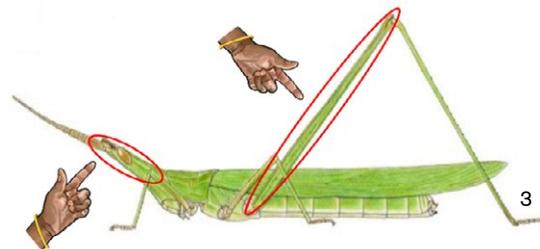
Soccet séew rucc

[so.tʃ:ʰet se:w ruf:h] (soh.chet seuw rooch)

“very thin grasshopper”



femelle / jigéen: 70–100 mm
mâle / góor: 35–60 mm



The head and body are narrow, and the legs extend far beyond the thorax.

¹ Ron Winkler

² Michel Lecoq

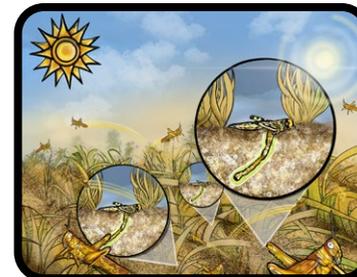
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Acrida bicolor

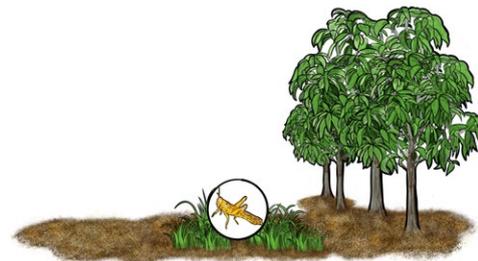
Diet



Season



Habitat



Aiolopus simulatrix



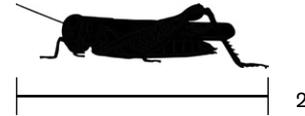
1

Aiolopus simulatrix

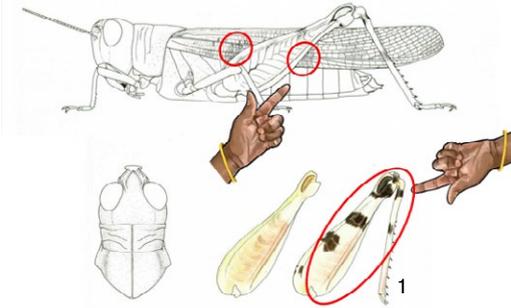
Soccet ñaari tipp-tipp

[so.tʃːhɛt ɲaː.ri tɪpːh tɪpːh] (soh.chet nyah.ree tip tip)

“two-mark grasshopper”



Female: 29–37 mm
Male: 22–32 mm



There are two dark spots on the side of the forewing.

¹ Michel Lecoq

² Mestre J.,1988. Les acridiens des formations herbeuses d’Afrique de l’Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Aiolopus simulatrix

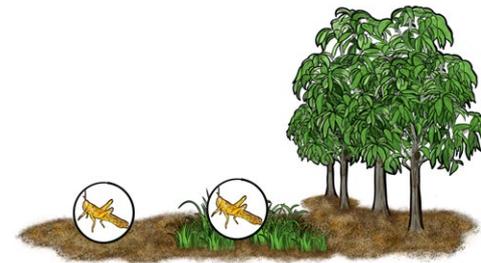
Diet



Season



Habitat

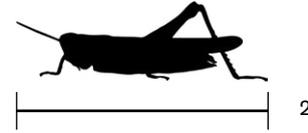


Catantops stramineus

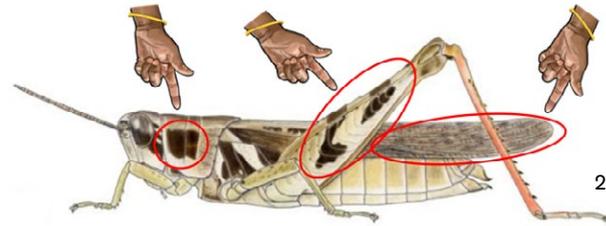


Catantops stramineus

Soccet fasu àll
[so.fɛːhɛt fa.su a:l] (soh.chet fah.soo al)
“zebra grasshopper”



Female: 27–32 mm
Male: 21–25 mm



There is a dark square on the pronotum
and dark spots on the hind leg.

¹ Michel Lecoq

² Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD.
<https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Catantops stramineus

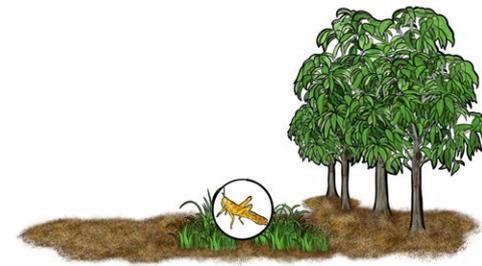
Diet



Season



Habitat



Chrotogonus senegalensis

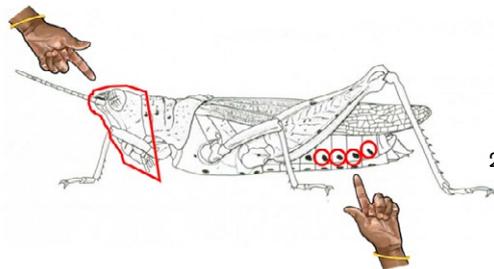


Chrotogonus senegalensis

Soccet mbott
[so.tʃiːhɛt mbotːh] (soh.chet mboht)
“toad grasshopper”



Female: 14–25 mm
Male: 11–17 mm



The skin is very bumpy and there are multiple spots on the thorax.

¹ Michel Lecoq

² Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Chrotogonus senegalensis

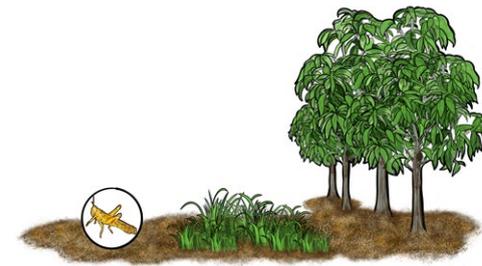
Diet



Season



Habitat



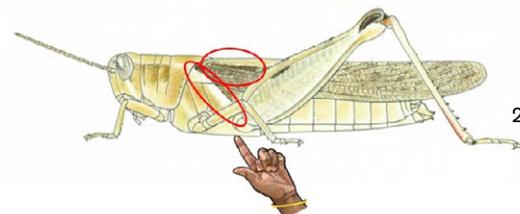
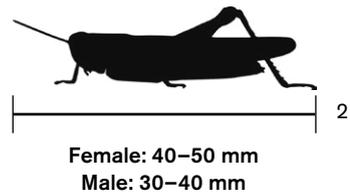
Diablocatantops axillaris



1

Diablocatantops axillaris

Soccet bu xées
[so.f:het bu Xe:s] (soh.chet boo xes)
“pale grasshopper”
devil grasshopper



There is a white line/streak followed by a dark forewing

¹ Michel Lecoq

² Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Diablocatantops axillaris

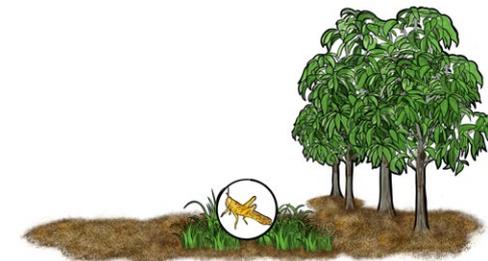
Diet



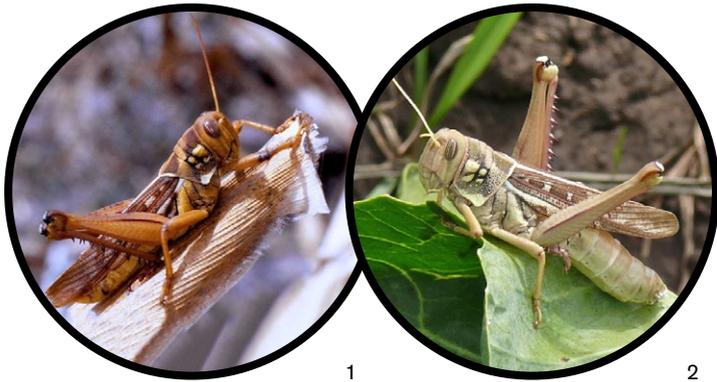
Season



Habitat



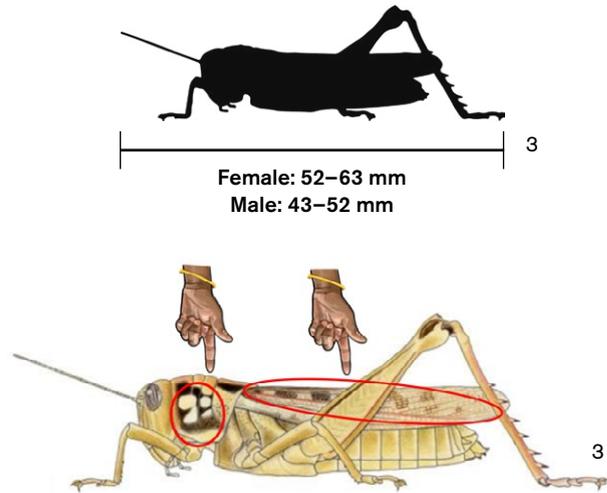
Kraussaria angulifera



Kraussaria angulifera

Soccet soldar

[so.tʃ:het sol.dar] (soh.chet sohl.dar)
“soldier grasshopper”



There are four yellowish spots on the pronotum and brownish spots on the forewing.

¹ Michel Lecoq

² Christiaan Kooyman. CC BY SA-4.0

³ Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Kraussaria angulifera

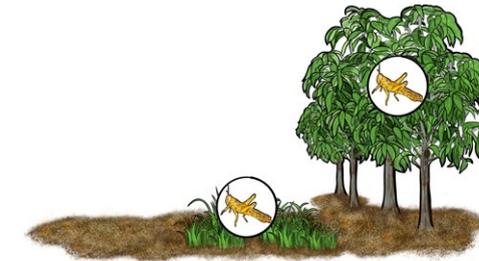
Diet



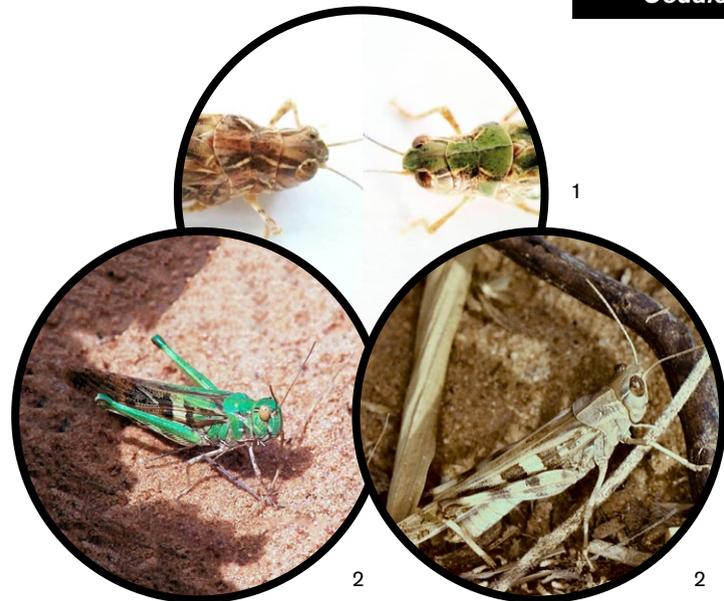
Season



Habitat



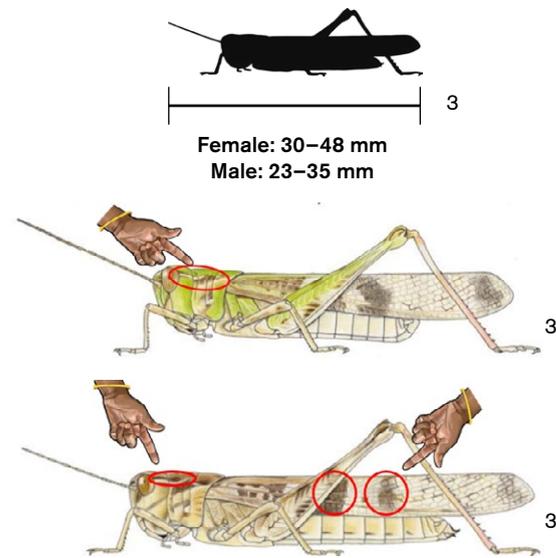
Oedaleus senegalensis



Oedaleus senegalensis

Soccet dugub
[so.fj:het du.gub] (soh.chet doo.goob)
"millet grasshopper"

Senegalese grasshopper



There is an "x" shape on the pronotum when viewed from above. The body can be green or brown.

¹ Marion Le Gall

² Michel Lecoq

³ Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Oedaleus senegalensis

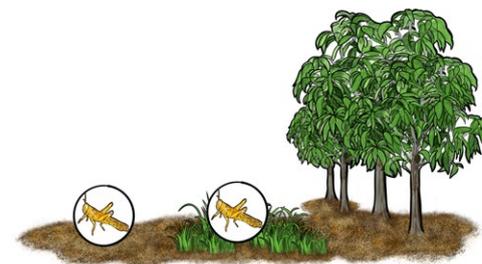
Diet



Season



Habitat

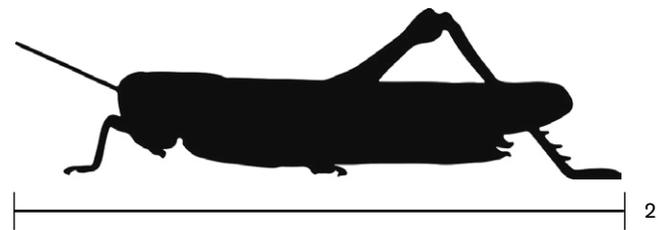


Ornithacris cavroisi

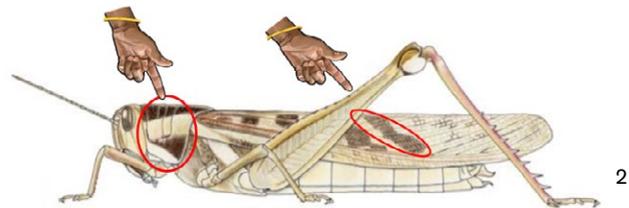


Ornithacris cavroisi

Soccet bëgg gerté
[so.tʃ:hɛt bɛg:h gɛr.te] (soh.chet bug gehr.tay)
“peanut-loving grasshopper”



Female: 70–92 mm
Male: 60–72 mm



There are two brown stripes and two white stripes on the side of the pronotum.

¹ Michel Lecoq

² Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Ornithacris cavroisi

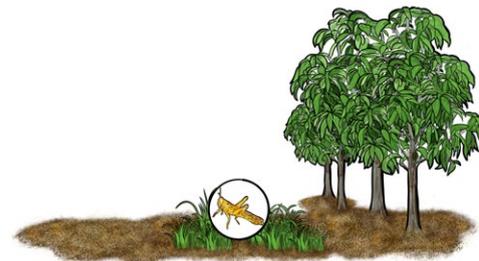
Diet



Season



Habitat

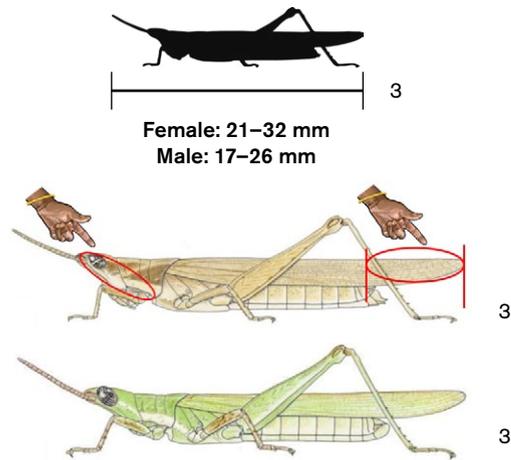


Pyrgomorpha cognata



Pyrgomorpha cognata

Soccet boppu pusó, yaraax laaf
 [so.tʃ:ʰɛt bɔ.p:ʰu pu.sɔ ya.ra:X la:f]
 (soh.chet bop.poo poo.soh ya.rahx lahf)
 “clear-wing needle-headed grasshopper”



There is a light streak starting at the head and extending along the thorax. The forewing is often longer than the abdomen.

¹ M.H. Luong-Skovmand

² Michel Lecoq

³ Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Pyrgomorpha cognata

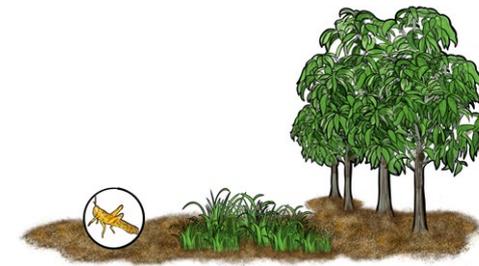
Diet



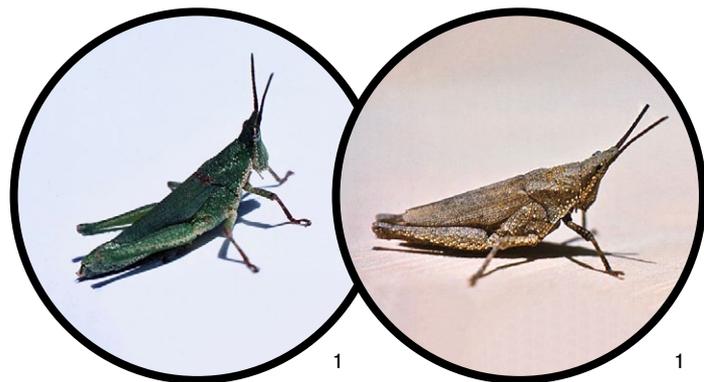
Season



Habitat

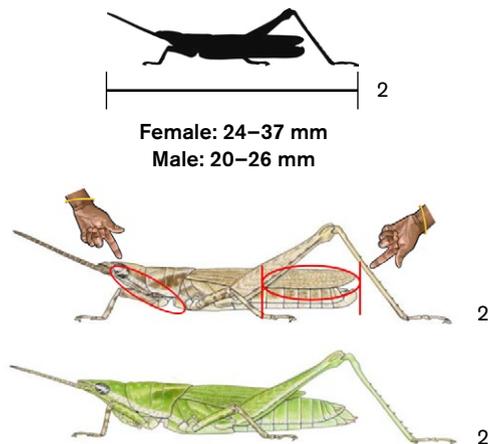


Pyrgomorpha vigneaudii



Pyrgomorpha vigneaudii

Soccet boppu pusó, xonq laaf
 [so.tʃ:hɛt bɔ.p:hʉ pu.sɔ XɔNq la:f]
 (soh.chet bop.poo poo.soh xonk lahf)
 “red-wing needle-headed grasshopper”



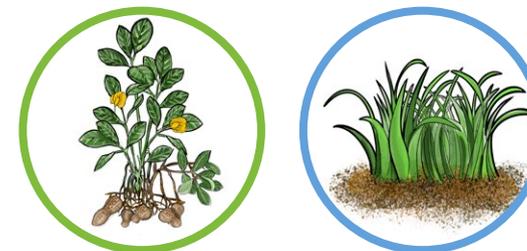
There is a light streak starting at the head and extending along the abdomen.
 The forewing is not longer than the abdomen. Skin is rough and spotted.

¹ Michel Lecoq

² Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Pyrgomorpha vigneaudii

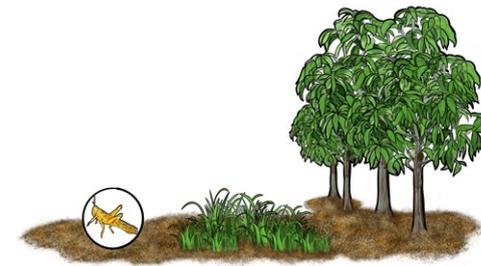
Diet



Season



Habitat



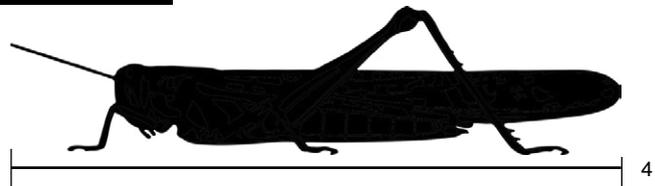
Schistocerca gregaria



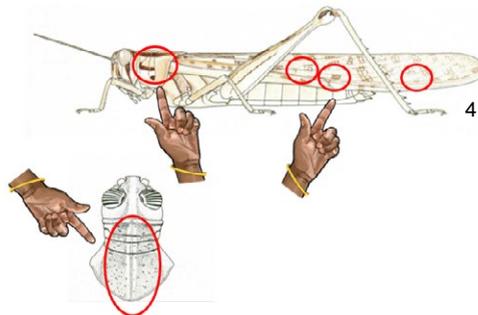
Schistocerca gregaria

Njééréér
[nje:.re:r] (njeh.rehr)
"locust"

desert locust



Female: 70–90 mm
Male: 60–75 mm



Note the spotted forewing. Color is variable:
gray or brown (solitary adults), reddish (immature
gregarious adults), or yellowish (gregarious adults
during laying period).

¹ Said Ghaout

² Food and Agriculture Organization of the United Nations (FAO) and the Desert Locust Information Service (DLIS).

³ Antoine Foucarte, French Agricultural Research Centre for International Development (CIRAD).

⁴ Mestre J., 1988. Les acridiens des formations herbeuses d'Afrique de l'Ouest. CIRAD. <https://doi.org/10.19182/agritrop/00081>. CC BY 4.0. Adapted by the authors.

Schistocerca gregaria

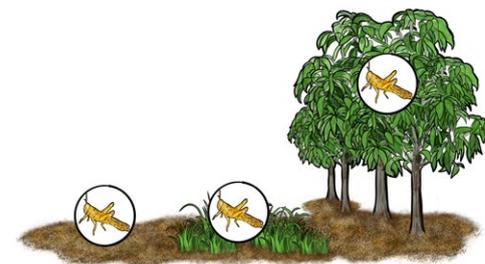
Diet



Season



Habitat





If you observe concerning grasshopper or locust activity at your farm or in your community, please call your regional Plant Protection Directorate base.

**Residents of the departments of Kaffrine, Birkelane, Malem Hoddar, Koungheul, Guingueneo, Diourbel, and Mbacke:
Nganda Base: 33 946 54 28**

**Residents of the departments of Sokone, Fatick, Foundiougne, Gossas, Kaolack, et Nioro du Rip:
Sokone Base: 33 948 31 21**