

Onion Diseases and Pests in Burkina Faso



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ABBREVIATIONS

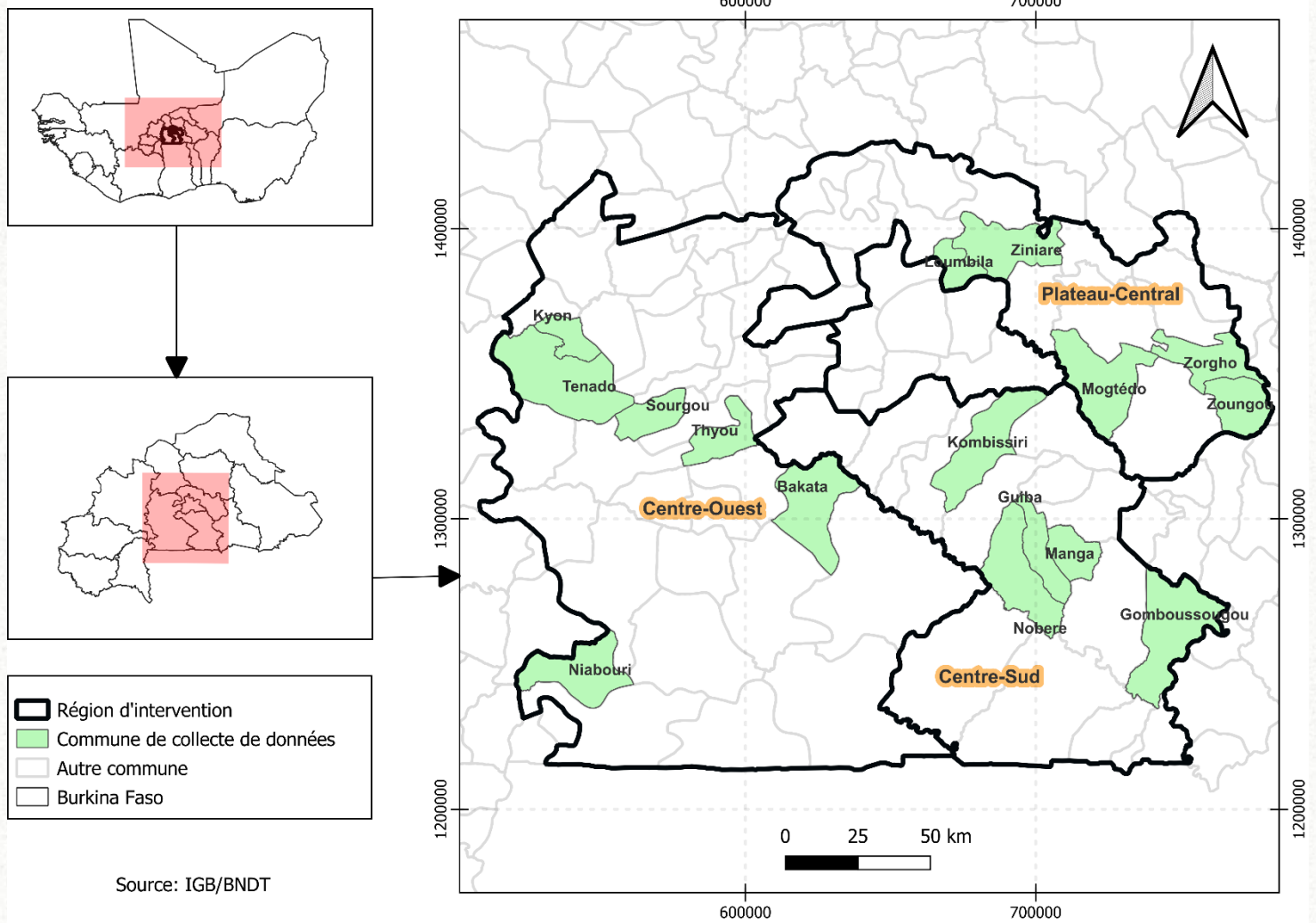
Climate data	
PMin	Minimum precipitation (mm)
PMax	Maximum precipitation (mm)
TMin	Minimum temperature (°C)
TMax	Maximum temperature (°C)
EMin	Minimum evapotranspiration (%)
EMax	Maximum evapotranspiration (%)
VMin	Minimum wind speed (m/s)
VMax	Maximum wind speed (m/s)

INTRODUCTION

In Burkina Faso, onion (*Allium cepa* L.) is the main vegetable crop in terms of production and area (FAOSTAT, 2022). Production rose from 17,775 tonnes in 2014 to 242,258 tonnes in 2020 (FAO, 2022). Onions are mainly produced in the North, Centre-Ouest, Centre-Est, Nord-Ouest and Hauts Bassins regions (PAFASP, 2014). The sector generates nearly 400,000 jobs, 100,000 of which are held by women. Considering the level of income generated for farmers and the role played in alleviating unemployment in rural areas, the onion industry today occupies a prominent place in Burkina Faso's agricultural policies. However, water management in market gardening and the problem of pest attacks are acute in onion production (Hien, 2016). Among pathogens, *Fusarium sp.* is recognized as one of the most dangerous fungal agents on onion, with a damage rate of over 50% (Zelmat et al., 2021). Inventory studies of fungal diseases of onions carried out by Dabiré (2017) showed that the main diseases present in Burkina Faso are purple spot disease caused by *Alternaria porri* and fusarium base rot caused by *Fusarium oxysporum* or *F. Solani*. These pathogens cause pre-harvest spoilage and loss of harvested produce during storage.

To contribute to the management of these pests, WASCAL in collaboration with the Ministry of Agriculture and Afrique Geosciences initiated the project "**Precision Pest and Disease Management System based on Multidimensional Big Data**". This project, acquired with the financial support of the European Union through the Innovation Fund of the Organization of African, Caribbean and Pacific States (OACPS), has made it possible to collect data on diseases and pests on tomato, onion and maize farms in the Centre-Ouest, Centre-Sud and Plateau-Central regions with the aim of developing digital solutions for the management of pests and diseases of these crops in Burkina Faso. This document summarizes the main pests and diseases present in the onion fields of the study area and the different means of control.

ZONE D'ETUDE



Data collection sites

MAIN PESTS (1/4)



Leek moth or defoliating caterpillar

Climate data	PMin	PMax	TMin	TMax	EMin	EMax	VMin	VMax
	0	21.0627	24.1477	33.7798	0.0002	0.0049	0.1037	3.5035



Characteristics

The adult is a small grayish-brown butterfly with a reddish head, about 6 mm long. When its wings are unfolded, it has a wingspan of around 15 mm, and a small white triangular spot appears in the middle of the rear part of its forewings. This spot remains visible on the butterfly's back even when at rest (wings folded). The larva is a small, more or less dark greenish-white caterpillar. Its head and legs are brownish yellow (CORAF, 2014).

On onion leaves, the larva settles directly inside the leaf's central cavity. It then eats away at the leaf tissue from the inside, leaving the outer epidermis intact. The damage then appears in the form of “windows” on the leaf surface (CORAF, 2014). The most severely attacked leaves eventually dry out. Foliage damage caused by moth larvae slows plant growth and favors the entry of diseases. In terms of the distribution of damage in fields, it seems that field edges would generally be the most affected (CORAF, 2014).

MAIN PESTS (2/4)



Leek moth or defoliating caterpillar

Means of control

Lutte préventive

- Crop rotation, rapid burial of crop debris and trimmings, and frequent mowing of grassy areas along field edges all help to reduce infestation. For organic farmers, netting uninfested plots during periods of moth activity could also be useful (CORAF, 2014). Larger, more vigorous plants withstand moth attack better than smaller or slower-growing ones. Ensuring vigorous growth throughout the season could therefore also help limit losses. To this end, adequate fertilization and irrigation of fields could therefore play a major role (CORAF, 2014).

Curative control

- Use authorized insecticides from the pyrethroid or organophosphate family before the young caterpillar burrows too deeply into the bole, while observing good plant protection practices to minimize the risk of resistance. A Bt (*Bacillus thuringiensis*) insecticide is also permitted (Jenner *et al.*, 2010).

MAIN PESTS (3/4)



Thrips tabacci

	PMin	PMax	TMin	TMax	EMin	EMax	VMin	VMax
Climate data	0	0.5105	24.6749	32.4248	0.0002	0.0038	0.7913	3.3434



Characteristics

Responsible for onion virosis, the yellowish adult has long, pearl-gray wings adorned with filaments. The very small larvae are whitish to light yellowish-orange or yellow-green with red eyes (Karuppaiah et al., 2023). Feeding mainly on the underside of young leaves, they suck the contents of onion cells, destroy chlorophyll and transmit viruses. Infested leaves are covered with numerous silvery spots corresponding to groups of emptied cells. During the day, thrips are mainly found at the base of leaves (Savadogo et al., 2020). They only emerge on the foliage in the cool of the morning, night or evening.

MAIN PESTS (4/4)



Thrips tabacci

Means of control

Preventive control

- Monitor onion plots regularly for early detection of the first infestations (presence of Thrips or silver traces) (Abir, 2022);
- Eliminate weeds, which can act as hiding places and hosts for thrips;
- Adopt a good cropping calendar so as to harvest before the end of March;
- Rotate crops other than tobacco, cowpeas and cucumbers;
- Use tolerant cultivars and varieties;
- A simple and abundant irrigation by sprinkling allows to clean the thrips from the attacked plants;
- Use of blue or yellow traps to eliminate outbreaks;
- Destroy crop residues as soon as harvesting is complete to prevent multiplication, dispersal and survival of residual thrips populations;
- Protect the nursery with a mosquito net to avoid early attacks (contamination) (Abir, 2022).

Curative control

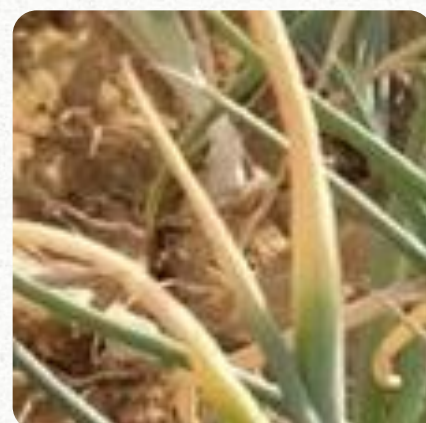
- Use extracts based on neem (leaves, oil), hot pepper, tobacco and garlic;
- Use registered insecticides based on dimethoate, cypermethrin, lambda-cyhalothrin + acetamiprid, methomyl, while respecting good phytosanitary practices to minimize the risk of resistance (Karuppaiah et al., 2023).

MAIN DISEASES (1/4)



Fusarium oxysporum

Climate data	PMin	PMax	TMin	TMax	EMin	EMax	VMin	VMax
	0	3.7466	27.8698	33.9251	0.0001	0.0020	0.2844	3.6456



Characteristics

It is a telluric fungus, capable of parasitizing a wide range of hosts. On cultivated plants, it is responsible for several symptoms such as seedling damping-off, root rot, browning and wilting leading to desiccation.

It can be transmitted via seeds, which are the main route for introducing the fungus into new production areas. Its presence is most often manifested by a cottony, more or less vigorous aerial mycelium. It spreads via infected planting materials (nursery stock, plants), drainage water and runoff (Sogoba et al., 2021).

Means of control

- Losses caused by *Fusarium* can be minimized by a long rotation of at least 4 years with a non-host plant.
- Storing bulbs at 4°C also helps limit losses.
- It's also important to use healthy certified seed.
- Soaking seedlings in a systemic fungicide before transplanting.
- Good reasoning of mineral fertilization, avoiding excess nitrogen, and good organic fertilization. However, the most important control measure remains the use of resistant varieties (Sogoba et al., 2021).

MAIN DISEASES (2/4)



Alternaria Spp.

	PMin	PMax	TMin	TMax	EMin	EMax	VMin	VMax
Climate data	0	4.9657	24.60	34.8216	0.0001	0.0012	0.3530	3.8764



Characteristics

The first signs of the disease appear on leaves and flowering stems. Symptoms appear on the plant's leaves in the form of small, water-soaked lesions (2-3 mm in diameter) whose centers become zoned, brown to purple. As the lesions enlarge, they become elongated and take on a violet-brown color. When numerous lesions appear on the leaf, they join together, causing the leaf to dry out completely. In wet weather, the surface of the lesion may be covered with brown to dark gray fruiting bodies of the fungus. Severely infected onion foliage may show signs of dieback.

Infection of the bulbs results in an abundant secretion of pigment which diffuses into the bulb through the envelopes, somewhat ahead of the fungus itself.

The fungus enters through the crown but can also penetrate through wounds on the fleshy scales.

Severe attacks by the fungus can lead to complete drying out of the onion field (Hien, 2016).

MAIN DISEASES (3/4)



Alternaria Spp.

Means of control

Preventive control

- Cultural practices that can reduce the level of infection start with sowing clean, uninfected onion seeds.
- Crop rotation with cereals (except corn) or grass can be beneficial in reducing the severity of the disease.
- Soil fumigation or steam treatment reduces damping-off to very low levels.
- Use resistant or tolerant varieties.
- Avoid excess nitrogen and water, and ensure good aeration of plants.
- Seed and soil fungicides are effective in reducing the likelihood of seed rot and damping-off.
- The use of manure or compost also helps control telluric onion diseases.
- Good field drainage and low planting density.

Curative control

- Biopesticides based on fungi (*Trichoderma harzianum*) and extracts of garlic (*Allium sativum*) and neem oil (*Azadirachta indica*) can be used.
- The use of chemical pesticides based on dithiocarbamate, iprodione, chlorothalonil, fudioxonil, pyraclostrobin, azoxystrobin, Calthio C, Apron Star 45 WS, Topsin 70 WG effectively reduce the severity of the disease (Nana et al., 2023).
- However, the use of a single type of fungicide throughout the growing season is not recommended, as it increases the susceptibility of onion leaves to disease.

MAIN DISEASES (4/4)



Mildew (Bulb rot)

Climate data	PMin	PMax	TMin	TMax	EMin	EMax	VMin	VMax
	0	2.7553	30.9546	34.0935	0.0001	0.0002	1.1055	2.9580



Characteristics

Mildew is caused by *Peronospora destructor* Berk. Onion bulb losses due to downy mildew can vary from 30% to 70% when the environment is conducive to the disease.

Elongated white or yellow spots appear on the leaves, often at the tips, and eventually a white-grey felting on the underside. Leaves rapidly turn brown, then dry out and become brittle.

The fungus remains in the soil and can therefore infect new plants. Spores are present in plant debris left on the ground and are easily dispersed by wind and splashing water drops. This disease favors secondary attacks by *Alternaria* and *Stemphylium*.

Means of control

- Cultural control involves adopting good cultural practices to reduce pest pressure.
- Crop rotation; use of healthy seeds and/or seeds pre-treated with a fungicide (Dabire, 2016); compliance with good cultural practices (nursery, planting density, irrigation, destruction of crop residues, etc.).
- Chemical pesticides such as azoxystrobin, mancozeb, potassium bicarbonate or hydrogen peroxide are used. Although the chemical control currently used is effective on a large number of pathogens, its repetitive and massive use has led to the emergence of resistant pathogenic strains (Dabire et al., 2023).

CONCLUSION

Photographs taken to document disease symptoms and pest damage in onion crops have provided a comprehensive inventory of the problems encountered in the Centre-Ouest, Centre-Sud and Plateau-Central regions, both during the rainy and dry seasons of the 2022-2023 crop year. This exhaustive collection was followed by recommendations for both preventive and curative control methods. As a result, this current brochure will contribute to improving the knowledge of supervisors and farmers about onion diseases and pests, while also being a useful tool for the management of these phytosanitary problems in Burkina Faso.

FUNDING

This brochure has been produced as part of the implementation of the PPeDMA_S project (Precision Pest and Disease Management System based on Multidimensional Big Data). This project is part of the AGriDI initiative (Accelerating inclusive green growth through agri-based digital innovation in West Africa). Financed by the European Union through the ACP Innovation Fund of the Organization of African, Caribbean and Pacific States (OACPS), AGriDI is implemented by the International Centre of Insect Physiology and Ecology (ICIPE), within its Regional Scholarship and Innovation Fund (RSIF) coordination unit, in collaboration with the University of Abomey Calavi (Benin), the Agropolis Foundation (France) and Gearbox Pan African Network (Kenya).

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