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Ethiopian Institute of Agricultural Research (EIAR)

Evaluation of released Arabica coffee varieties for Their Tolerance to Bacterial Blight of Coffee (BBC) *at Sidama and Gedeo Zones, Southern Ethiopia.*

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Paper presented to the African Coffee Scientific Conference.
Hotel Nomad, Libreville, Gabon 20 - 27 November 2018

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Outline of Presentation

1. Introduction
2. Methodology
3. Results and Discussion
4. Conclusion and Recommendations

1. INTRODUCTION

- About 25-30 million people (25%) for livelihood.
- Annual total production is about 449,230 tons
- Current area of production 1.063 Million (725,961 ha)
- The coffee sub-sector currently make up some 30% of the country's total export (CSA, 2017)

53 % consumed locally
/ Protection in case of drop in international prices/

- food/beverage and stimulant
- a collective action and discussion driver in **several** important social and community safety issues
- Ethiopia is the biological and cultural home of Arabica Coffee

Environmental issues and climate change:

- Growing shade trees with coffee is a sustainable future for Ethiopian coffee.
- It is the best adaptation system to minimize the negative impacts of the rising temperature.

Two main approaches

- *In-situ* in the wild, and on-farm
  - UNESCO Biosphere Reserve (Yayo, Kafa, Sheka forest Biosphere reserve)
- *Ex-situ* in field gene banks

Productivity

Country/Region	Yield (kg/ha)
Vietnam	1,800 – 2,400
Brazil	1,500 – 1,800
Colombia	900 – 1,200
Ethiopia	600 – 700

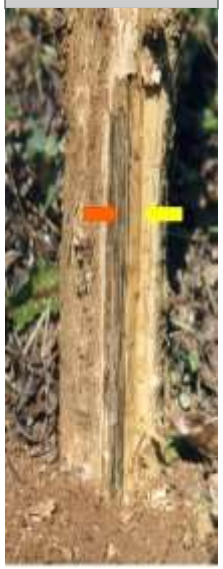
Low productivity in Ethiopia

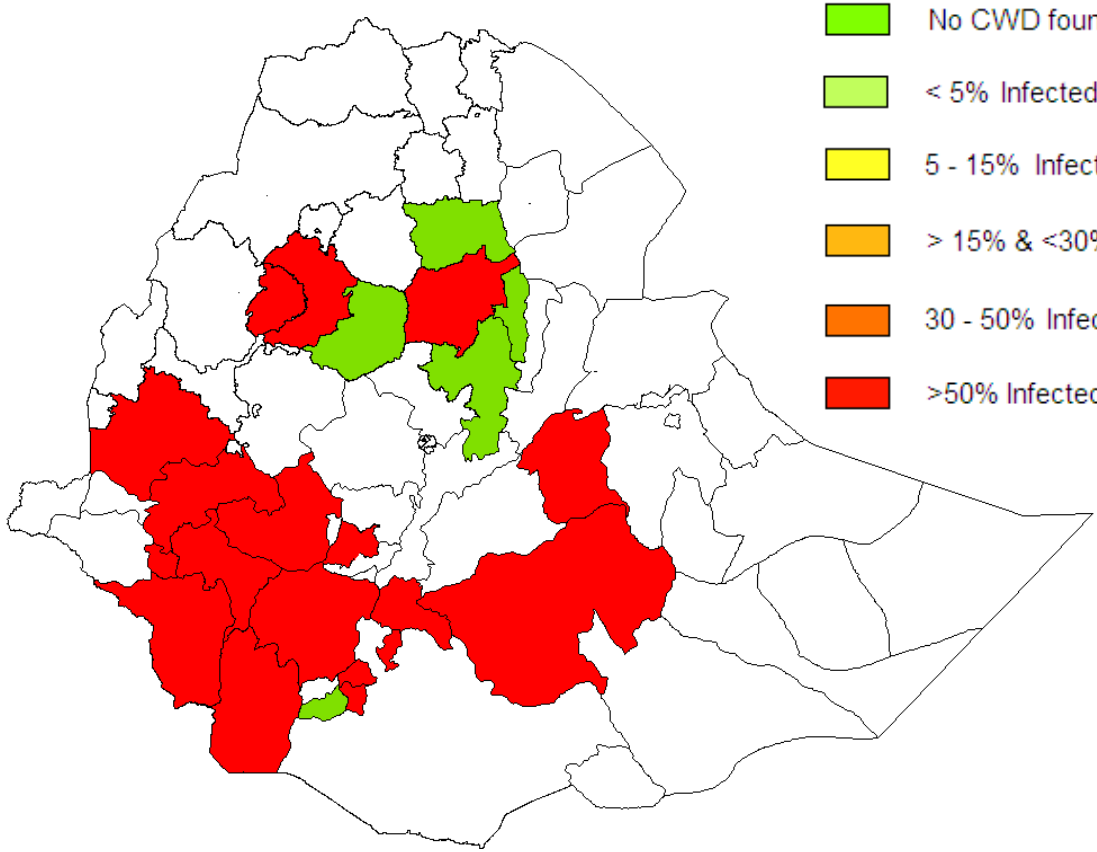
- ✓ limited use of improved technologies and best practices by most small-holder farmers,
- ✓ The widespread and prevalence of insect pests, diseases and coffee weeds.

1. 1 Coffee diseases limiting coffee production

- CBD causes 29.9% average crop losses to total harvestable coffee yield in Ethiopia (Kumulachew *et al*, 2016).

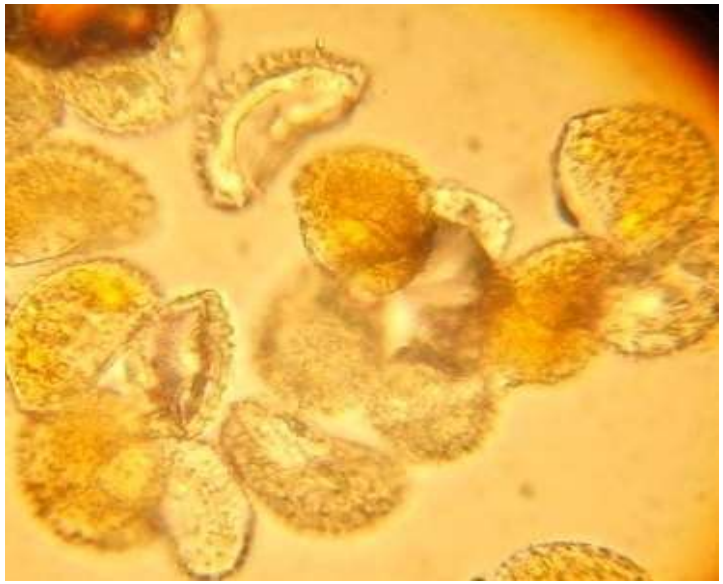
CWD





Average severity (% trees infected per farm) of Coffee Wilt Disease in different zones in Ethiopia. CABI, 2003.

COFFEE LEAF RUST

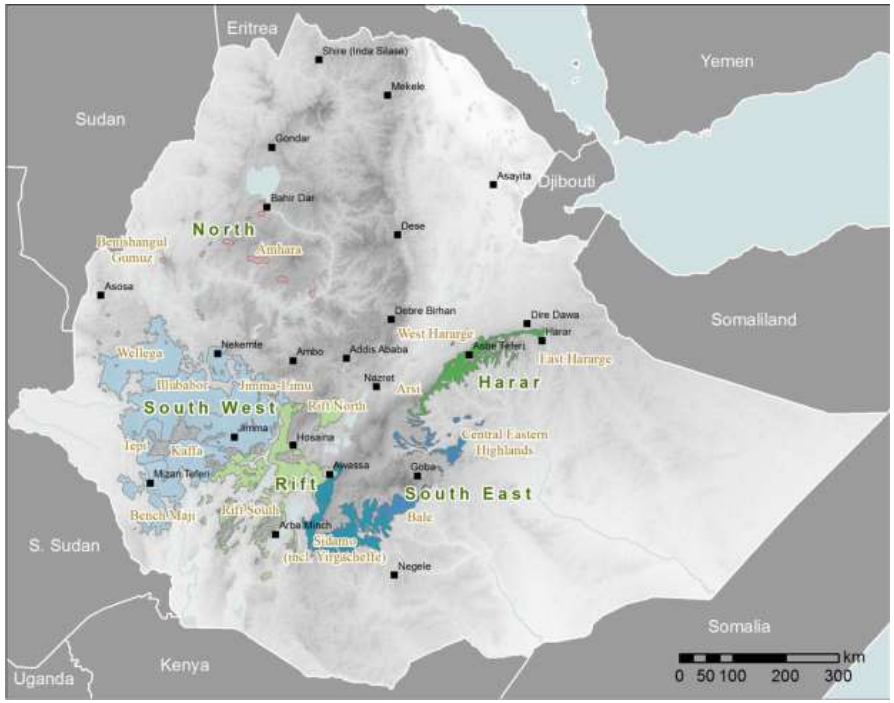


Coffee leaf rust has never reached epidemic level to cause eradication of Arabica coffee.

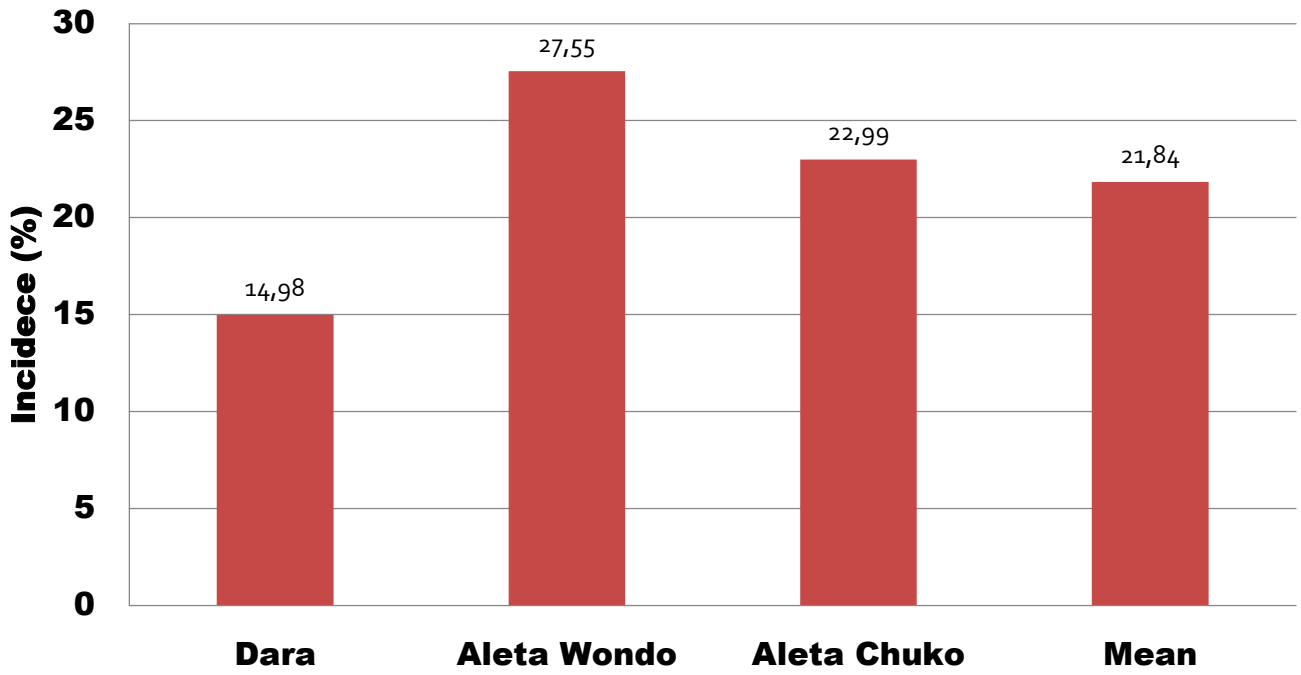
- long term coexistence of rust and coffee which created a balanced pathosystem and
- high level of horizontal (race non specific) resistance
- Unlike to previous observations CLR incidence was seen at 2100 m.a.s.l. which is uncommon before (Weyesa *et al*, 2016).

Bacterial Blight coffee /*Pseudomonas syringae/*

- In Ethiopia, BBC was reported in Sidama Zone of SNNPR (Girma *et al.*, 2012). However with changing climatic conditions the disease has been observed at Gedeo, Wolita and Kembata-Tembaro Zones of SNNP regional state.



BBC incidence in affected areas



- The use of resistant cultivars reduce risks associated with excessive use of copper sprays that include environmental pollution and phytotoxic effects on coffee trees.
- In Ethiopia there is no information on the status of commercial coffee cultivars for their tolerance to BBC.
- The objective of this study was to evaluate the reaction of commercially grown coffee cultivars against BBC under field conditions.

2.Methodology

The study was conducted in the field at districts of

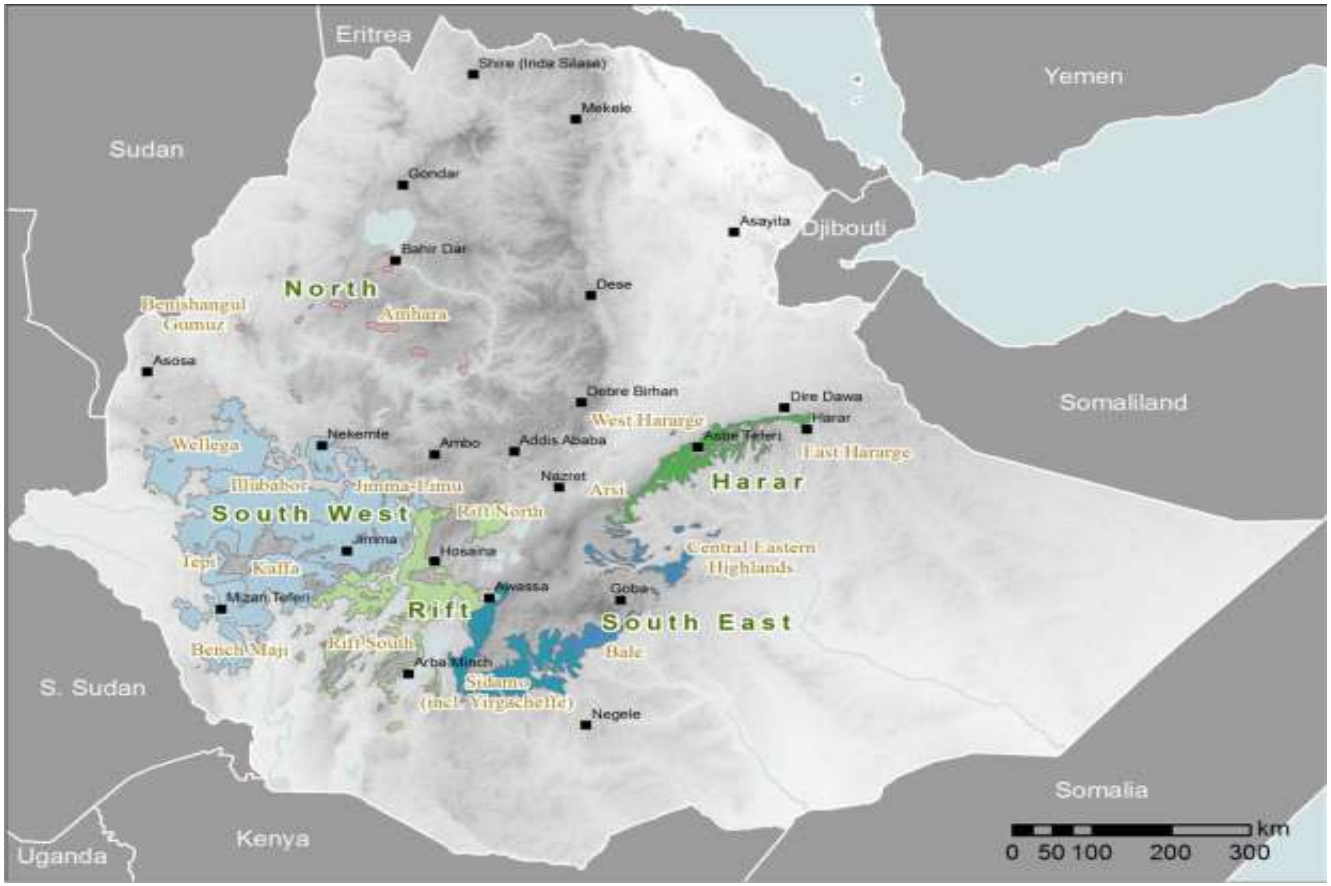
- Dale, Aleta wondo, Aleta chuko, Dara (Sidama zone)
- Wonago, Dilla Zuria, Yirgachefe districts (Gedeo Zone)

- From each district two peasant associations (PA) was selected
- from each PA separate five sample farms was selected for local coffee and released cultivars.

2.1 Coffee Cultivars, their origin and year of release

Coffee cultivar	Region/Location	Altitude (in M.a.s.l)	Year Released
Angefa	Gedeo Zone, Wonago Woreda	1900	2006
Koti	Gedeo Yirgachefe Woreda	1800	2010
Odicha	Gedeo Zone, Gelana Abaya Woreda	1815	2010
74112	Metu/ Bishare Iluababor	1710	1978/79
74110	Metu/ Bishare Iluababor	1710	1978/79
741	Gera/ EIAR/ Jimma	1990	1977/78
74140	Metu/ Bishare Iluababor	1710	1978/79
7440	Washi, Kaffa	1700	1979/80
744	Washi, Kaffa	1700	1979/80
74158	Metu/ Bishare Iluababor	1710	1978/79

Coffee growing areas



Disease severity was scored using 1-9 scale (Ito et al., 2008) with modifications.

1= absence of dark necrotic lesions
2=(3%)
3=(12%)
4=(25%)
5=(42%)
6=(58%)
7=Blighted leaves and necrotic twigs (75%)
8=Blighted leaves & dark necrotic lesions of twigs 88 % and
9= dark necrotic lesions & blighted leaves >88%.

Data obtained was entered and summarized using Microsoft Excel spread sheet.

3. Result and Discussion

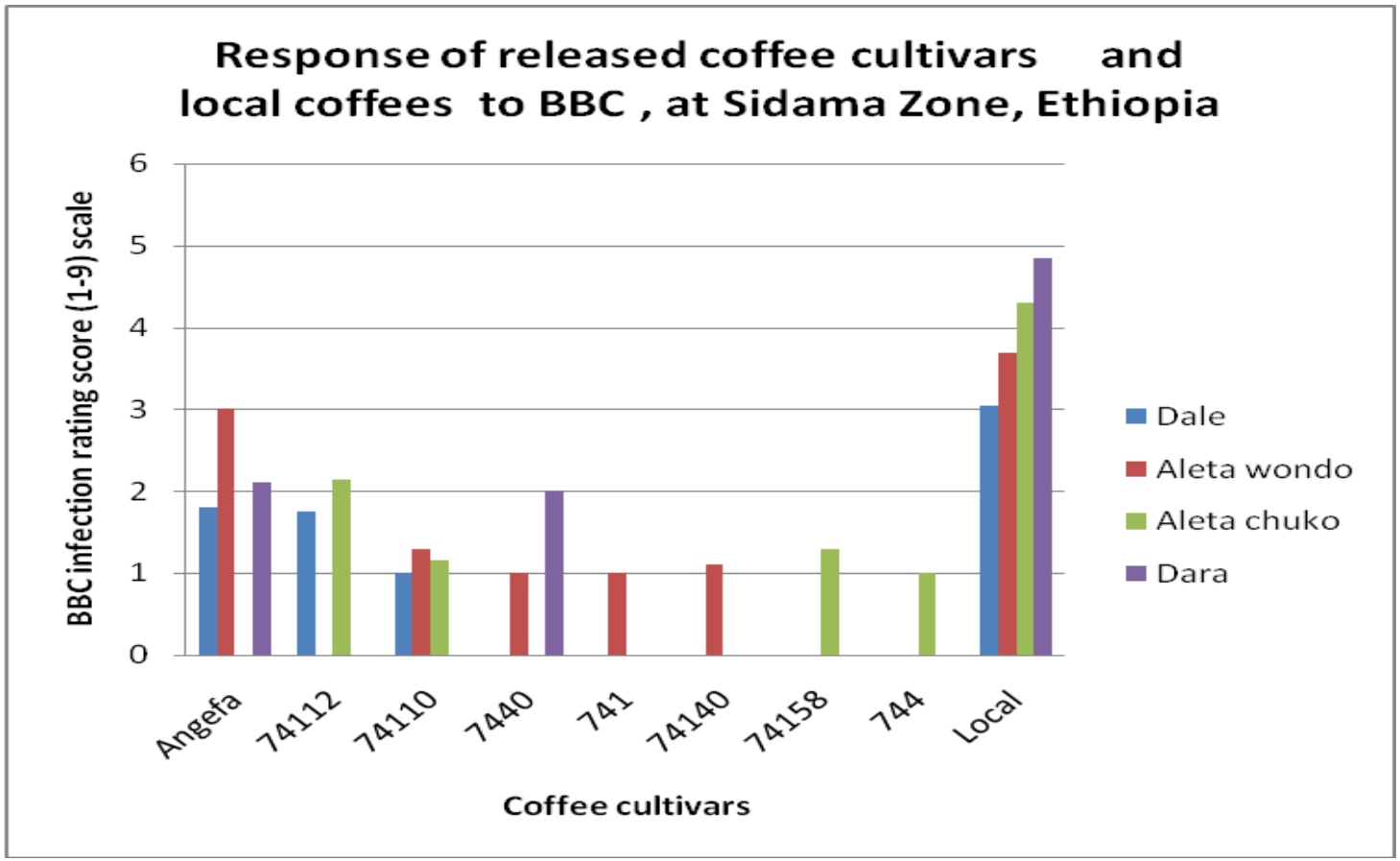
3.1 Symptoms of bacterial blight on coffee

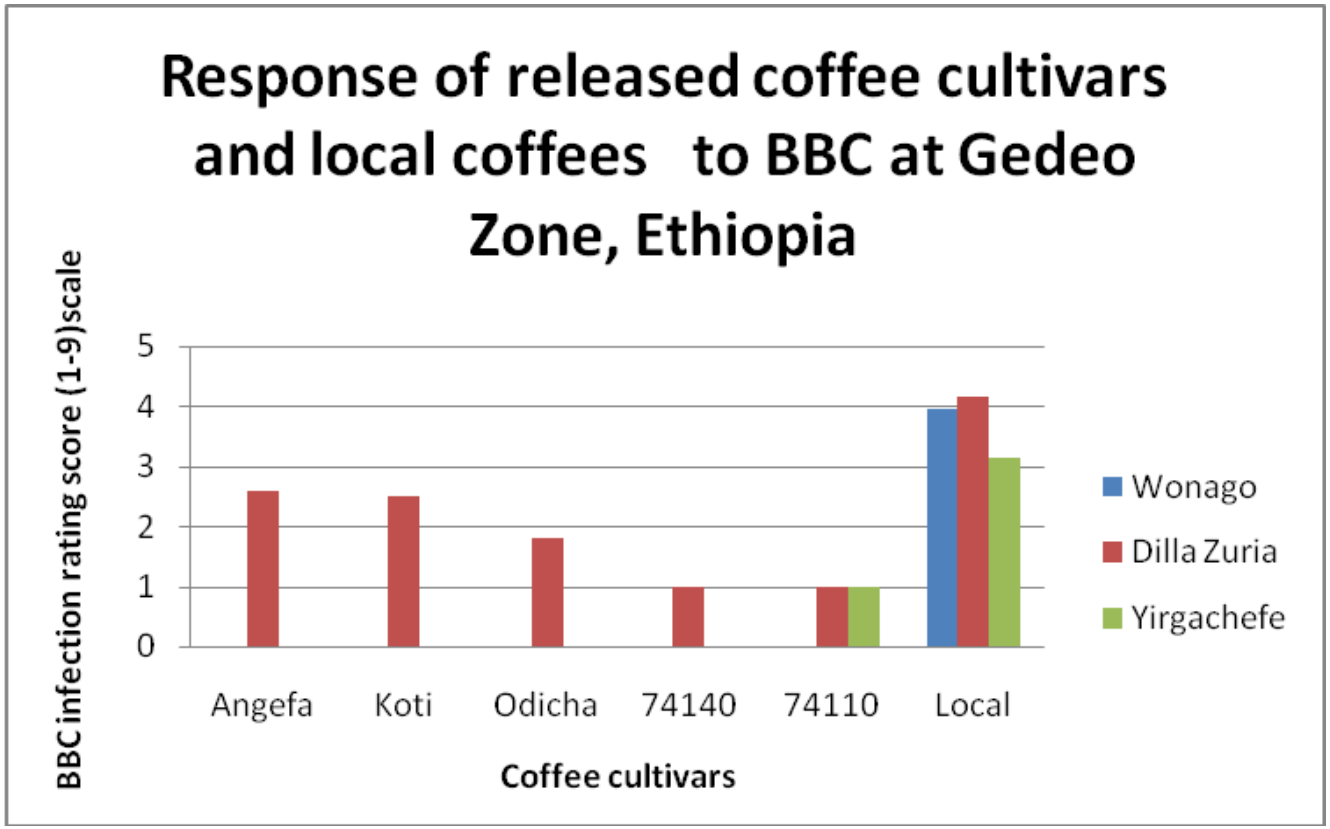
- Lesions on the leaf begin as water-soaked spots that turn black and expand.
- The leaves become necrotic and curl inwards, but remain attached to the plant.

- The lesion **girdle** the **branch**, damaging the vascular tissue and causing the branch above the blackened node to wilt and die.
- The most **typical symptom of** heavy infestations are blackened tips of branches looking like burned
- The disease was observed at nursery and stumped coffee trees

3.2 Weather situations favoring the Infection

- Optimum temperatures and rain fall for this area tend to be around 11.9 to 25.1 °C. and 1572.2 to 2406 mm
- Infections are mostly found after **cool nights**
- most frequent after **hail storms where the wounds made** by the hail are the entry ports for the bacteria to infect the plants
- The disease epidemic is found to be favored with current climate change scenarios/ Heavy and Prolonged rain, and strong winds/


Response of released coffee cultivars and local coffees to BBC , at Sidama Zone, Ethiopia
BBC infection rating score (1-9) scale
0
1
2
3
4
5
6
Angefa
74112
74110
7440
741
74140
74158
744
Local
Coffee cultivars
Dale
Aleta wondo
Aleta chuko
Dara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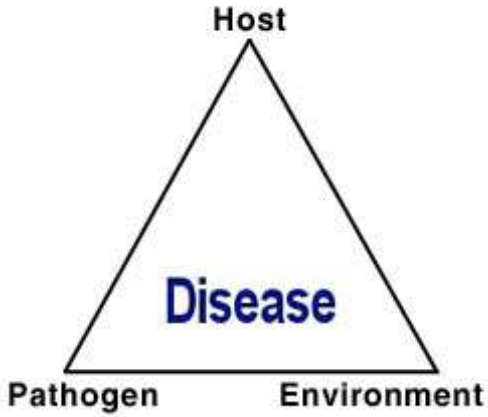
Local
Coffee cultivars
Wonago
Dilla Zuria
Yirgachefe


Host
Disease
Pathogen
Environment

Multiple disease resistant under field condition

- CBD
- CWD
- BBC

4. Conclusion and Recommendations

- Bacterial blight of coffee was found in all districts to varying extents of damage among surveyed coffee districts.
- The disease attacks young coffee seedlings, matured and stumped coffee trees
- At Dara district of Sidama Zone coffee nursery site 44,000 BBC infected coffee seedlings of Angefa coffee cultivar were uprooted and burned at the spot.
- Comparatively high severity of BBC was observed on old and neglected coffee farms than well managed and having good raw planting pattern.

- Strong efforts to contain its large-scale spread and damage to unaffected coffee growing areas are more imperative.
- Quarantine is an important cultural control method for BBC and is aimed at preventing the movement of susceptible and contaminated planting materials to ‘clean’ areas where it can be a source of new disease outbreaks.

IDM is ideal for the management of BBC

- use of tolerant cultivars;
- provision of balanced crop nutrition
- use of cultural practices like pruning or cutoff and burning of affected branches just few centimeters below the infection.
- Thus, further in-depth research on the
  - disease epidemiology,
  - detailed characterization of the bacterial strains
  - control practices are required along with exploring and developing resistant varieties against the emerging bacterial blight of coffee

Thank you for your attention!!!