Biological Control Vectors

CCARDESA
Centre for Coordination of Agricultural Research and Development for Southern Africa

Technical Brief 53

Vectors are organisms that carry diseases from one living being to another without showing symptoms of the diseases themselves. Some of the most common forms of vectors are blood sucking insects such as mosquitos, fleas, lice, ticks and other similar insects, and rats/rodents. Places such as stagnant water and dumping sites can be ideal habitats for vectors to reside and transmit. The use of natural vector predators can help reduce or eliminate vector populations. The most common vectors in southern Africa are insects (tsetse flies-trypanosomiasis), animals (foot and mouth disease through cattle or people with contaminated shoes), tick-borne relapsing fever (TBRF) and Crimean-Congo haemorrhagic fever (CCHF). Sanitising the life-cycle of vectors, implementing pest traps and introducing pest predators are means of reducing the spread of disease. The impacts of climate change, especially increased heavy rainfall and higher temperatures can encourage vector populations to grow quicker than normal. Simple strategies to control vectors includes keeping livestock surroundings clean, avoiding livestock access to stagnant water, fencing areas off, restricting animal access to certain locations, can all control biological vectors and assist in reducing vector spread.

MOST SUITABLE AGRO-ECOLOGICAL CONDITIONS

Value chain

- Maize
- Sorghum
- Rice
- Livestock
- Other

Soil texture

- Light
- Medium
- Heavy

Climatic zone

- Arid
- Semi-arid
- Sub-humid
- Humid

Water source

- Rainfed
- Partly irrigated
- Irrigated

Annual average rainfall (mm)

- < 250
- 250 - 500
- 500 - 750
- 750 - 1000
- 1000 - 1500
- > 1500

Topography

- Flat to gentle slope (0 – 5 %)
- Moderate to rolling slope (6 – 15 %)
- Hilly slope (16 – 30 %)
- Steep slope (> 30 %)

MOST APPROPRIATE CONDITIONS AND REQUIRED INPUTS

Farming system

Does it require collective action

- Yes
- **No**

Characteristics

- Subsistence
- Commercial Small
- Commercial Medium
- Commercial Large

Farm size (ha)

- < 2
- 2 to 5
- 5 to 10
- > 10

Mechanisation

- Manual
- Animal
- Mechanised

Human resources

Labour intensity – level of effort

- Low (household)
- Medium (seasonal)
- High (outside labour)

Gender/youth smart (low investment/low labour requirements)

- Yes
- No

Financial resources

Initial investment

- Low
- Medium
- High

Maintenance Costs

- Low
- Medium
- High

Access to finance capital or credit required

- Yes
- No

Enabling Environment

Extension support

- Yes
- No

Access to inputs

- Yes
- No

Market access

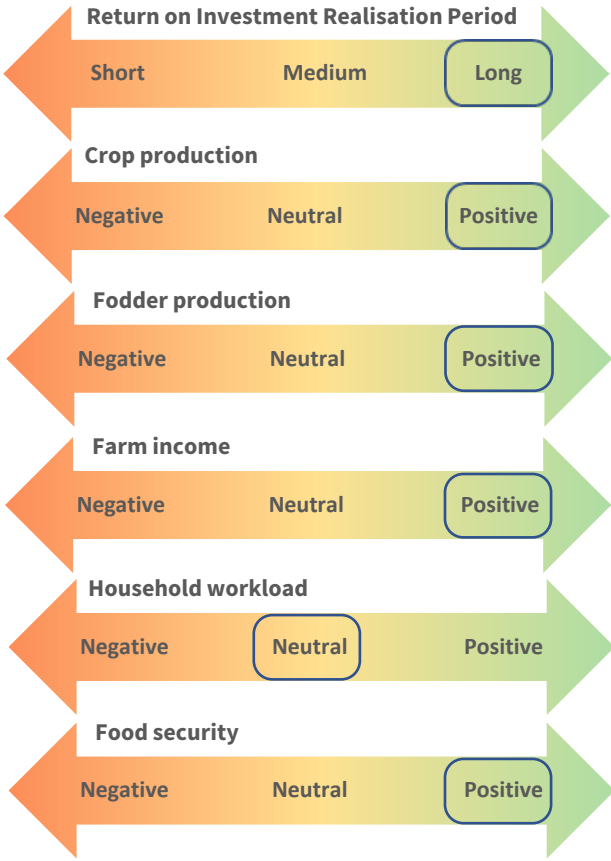
- Yes
- No

The purpose of this technical brief is to guide where this **practice, technology or strategy** could be applied. It may be applicable in other circumstances, but this brief focuses on where it is possibly **most suitable**. Content is general, and should be contextualised depending upon locality. The brief provides an overview, details of appropriate agroecological characteristics, appropriate conditions and inputs, possible outcomes and impacts, how the **practice, technology or strategy** should be applied, potential benefits and drawbacks, and provides suggestions for further reading in terms of CCARDESA materials and other sources, including those used to develop this technical brief.

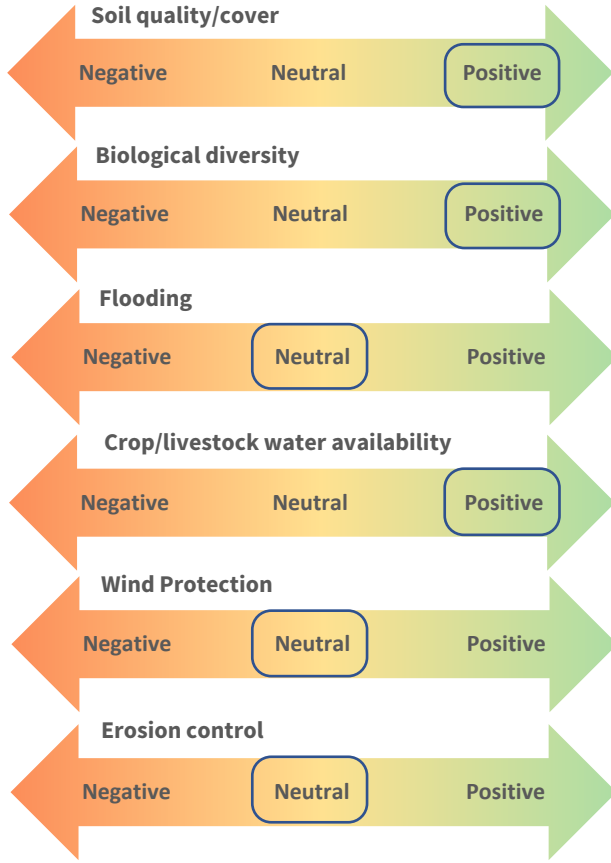
*CCARDESA is a subsidiary of SADC, coordinating and harmonising agricultural research and development in Southern Africa. This **Technical Brief** is part of a series of materials designed to support **Knowledge Products on climate smart agriculture** available here: www.ccardesa.org/saaiks-knowledge-hub*

POSSIBLE IMPACT/OUTCOMES

Socio-Economic Impacts Positive or Negative



Ecological Impacts Positive or Negative



These descriptors indicate whether the practice, technology or strategy has a positive, neutral , or negative impact or outcome
Those with no box are deemed not-applicable

TECHNICAL APPLICATION

To effectively implement biological control vectors:

- **Step 1:** Research common vectors in the local area and ensure that farmers are informed about the kinds, description, lifecycle and common habitats of these vectors, such as tsetse flies, ticks, biting flies.
- **Step 2:** Avoid allowing livestock access to dirty and damp environments as well as very bushy areas as these locations are common habitats for vectors.
- **Step 3:** Use of traps or even introduction of vector predators to livestock to manage vector spread could be used. This could include introducing epsilon traps for tsetse flies to promote vector control.
- **Step 4**: If rodents are found in or around livestock, introduce rodent control methods such as traps and/or rodent predators (cats, etc) and bury any remains far from livestock areas.
- **Step 5:** Fence off areas of high vector prevalence, such as stagnant water, ensuring that livestock do not access these areas.
- **Step 6:** Examine any rangeland to determine whether there are vectors in the vicinity such as biting insect, or locusts that may damage maize crops and fruit flies that damage tomatoes.
- **Step 7:** Community radio can be an effective method for extension officers to inform communities about outbreaks, or impending infestations.

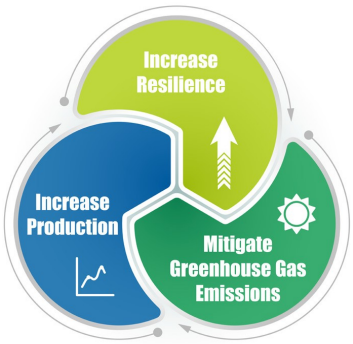
CLIMATE SMART AGRICULTURE OUTCOME(S)

Reflecting how this **practice, technology or strategy** contributes to Climate Smart Agriculture outcomes

Reduces incidence of disease results in healthier, more productive animals.

Reduces risk of secondary infections in livestock. Sale of livestock is a common coping strategy so having more/better livestock to sell increases resilience.

Potential for more efficient conversion of feed into meat/diary which can reduce emissions per unit production.



SUMMARY/KEY ISSUES

Benefits

- Identifying the common vectors in the area is a key first step to understanding how to manage them.
- Using vector traps and introducing vector predators can also help manage livestock exposure.

Drawbacks

- Biological vectors transport disease that can have devastating impacts on livestock.

REFERENCE MATERIAL

CCARDESA Related Content

- CCARDESA, 2019. Technical Brief 17, Climate Smart Genetic Improvement Options for Livestock.

Additional Information

- The Food and Agriculture Organisation (FAO), 2009. The Use and Exchange of Biological Control Agents for Food and Agriculture. Rome, Italy.
- The Food and Agriculture Organisation (FAO), 2007. The Sustainable Management of Biodiversity for Biological Control in Food and Agriculture: Status and Needs. Rome, Italy.

Citation: CCARDESA and GIZ 2019. Technical Brief 53: Biological Control Vectors. CCARDESA Secretariat, Gaborone, Botswana.