International Institute of Tropical Agriculture (IITA)

# Virus diseases of cowpea in Africa

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Research Guide 53

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# Virus diseases of cowpea in Africa

**Objectives.** This guide is intended to enable you to:

- discuss the importance of cowpea viruses and virus research;
- describe importance, distribution, symptoms, transmission, and biochemical nature of viruses affecting cowpea in Africa;
- separate and identify cowpea viruses;
- recommend methods for control of cowpea virus diseases.

## Study materials

- Slides of viruses and virus symptoms.
- Cowpea plants with virus symptoms.
- Virus vectors.

## Practicals

- Identify and evaluate virus diseases in cowpea fields.
- Identify virus vectors.
- Conduct serological methods.
- Practice virus identification and separation according to section 10.
- Rogue diseased plants in a cowpea field.

**Questions**

1 What is presently the most effective method for control of cowpea virus diseases in Africa?
2 How many viruses are separated on cowpea worldwide and Africa?
3 What are the symptoms of CYMV?
4 How is CYMV transmitted?
5 What is the biochemical nature of CYMV?
6 What are the symptoms of the 'African brain' of CABMV?
7 What is the relationship between CABMV and BICMV?
8 What is the geographical distribution of CABMV/ BICMV?
9 How can you differentiate CMeV from CYMV?
10 What are the symptoms of CUMV?
11 To what plants has SBMV been transmitted?
12 How is CGMV transmitted?
13 To what crops can CMMV be a threat?
14 What is the importance of SHMV?
15 How are cowpea viruses identified?
16 What simple methods are available for identifying viruses?
18 What measure may control of cowpea virus involve?
19 Why is the use of insecticides to prevent virus transmission only partially successfully?
20 What is the best single method for control?
21 What measures should be considered for profitable cultivation of cowpea?

# Virus diseases of cowpea in Africa



**Abstract.** Eight viruses are reported from cowpeas in Africa. Cowpea viruses are described from lowland, humid and sub-humid West Africa, as well as from mid-altitude ecological zones mainly found in eastern and southern Africa. Wherever facilities are limited and detailed characterization is not possible, a simple procedure using a combination of serology (agar-gel diffusion test), inoculation to test plants, and vector transmission studies, is proposed for the identification of the cowpea viruses reported so far from Africa. The possibilities of controlling these viruses are briefly discussed.

# 1 Cowpea viruses

Cowpea *(Vigna unguiculata)*, also called southern pea and blackeye pea, is an important food and fodder legume in the sub-humid tropics of Africa. It provides more than half the amount of plant protein in human diets in those areas.

In the subsistence agriculture of tropical regions, grain legume yields are often low, mainly due to pests and diseases. Among numerous pathogens are several viruses known to infect cowpea. The effects of these viruses can be devastating and they are a major constraint to increased production.

Host-plant resistance is currently the most effective method for control of cowpea virus diseases in Africa. Thus, an adequate knowledge of the entire range of viruses, and their strains, occurring in the main cowpea-growing areas of Africa is a prerequisite for effective control.

Of more than 20 viruses reported on cowpea from different areas of the world, eight are known to occur on cowpea in Africa (Table 1). Some of these viruses are only of local importance, others occur occasionally and are of minor importance while some are widespread.

Information on virus diseases of cowpea in many African countries is still scanty. Details of symptomatology, transmission, geographical distribution and properties of viruses as summarized here are based on surveys in various African countries as well as in-depth characterization of viruses carried out over several years at IITA.

**Table 1.** Viruses reported from cowpea in Africa and their properties.

| Virus | Virus group | Geographical distribution | Transmission | | | Virus particle | |
|---|---|---|---|---|---|---|---|
| | | | Sap | Insect | Seed (%) | Shape | Size (nm) diameter/ length |
| Cowpea mosaic virus (CPMV)/Cowpea yellow mosaic virus (CYMV) | Comovirus | Africa, Surinam, Cuba | + | Beetle | 0-5 | Isometric | 24 |
| Cowpea aphid-borne mosaic (CAbMV)/Blackeye cowpea mosaic virus (BICMV) | Potyvirus | Africa, Italy, USA, Asia, South America, Australia | + | Aphid | 0-40 | Filamentous | 750 |
| Cowpea mottle virus (CMeV) | Ungrouped (possibly carmovirus) | Nigeria, Côte d'Ivoire, Bénin, Togo | + | Beetle | 0-10 | Isometric | 30 |
| Cucumber mosaic virus, cowpea strain (CuMV) | Cucumovirus | Probably worldwide | + | Aphid | 4-26 | Isometric | 28 |
| Southern bean mosaic virus, cowpea strain (SBMV) | Sobemvirus | North America, India, West Africa | + | Beetle | 3-4 | Isometric | 28 |
| Cowpea golden mosaic virus (CGMV) | Geminivirus? | Nigeria | + | Whitefly | 0 | ? | ? |
| Viruses similar or identical to CGMV | Geminivirus? | Senegal, Kenya, Niger, Mauritania, Mozambique, Tanzania, (also Brazil, India, Pakistan) | + | Whitefly | 0 | ? | ? |
| Cowpea mild mottle virus (CMMV) | Carlavirus | Ghana, Kenya, Nigeria, Côte d'Ivoire, (probably worldwide) | + | Whitefly | 0-90 | Flexuous rod | 650 |
| Sunn-hemp mosaic virus (SHMV) | Tobamovirus | India, Nigeria, USA | + | ? | 4-20 | Rigid rod | 300 |

It is hoped that this description of viruses in cowpea in Africa will stimulate more research that will lead to a better understanding of these and other viruses of cowpea in various countries. Moreover, this information will assist breeders in determining priorities in breeding for resistance to the viruses.

## 2 Cowpea yellow mosaic comovirus (CYMV)

The virus referred to as cowpea mosaic virus was originally described as cowpea yellow mosaic virus (CYMV), which explains our preference for the latter name. The virus has been described from both West and East Africa. The diverse symptoms produced by CYMV differ with cowpea variety and isolates of the virus considered.

Systemic symptoms in susceptible varieties range from an inconspicuous, lightgreen mottle to a distinct yellow mosaic, leaf distortion with significantly reduced growth, and premature death of the plant. Yield reductions from CYMV range from 60-100 %.

Bock (1971) reported the susceptibility of pigeon-pea *(Cajanus cajan),* which is widely grown as a perennial crop in the coastal areas of Kenya and may serve as a reservoir of the virus. CYMV, or a very similar virus, has also been observed at a very low incidence on soybean in Nigeria.

CYMV is readily sap-transmissible and it is transmitted by various beetle species. In Africa, the galerucid beetle *Ootheca mutabilis* (Chrysomelidae) has been reported to be an efficient vector; *Paraluperoides quaternus* (Chrysomelidae) and *Nematocerus acerbus* (Curculionidae) also transmit the virus.

CYMV has been reported to be seed-borne in cowpea, although at low levels. However, recent studies at IITA, Ibadan, using many seeds of different cowpea varieties, have provided no evidence of seed transmission.

CYMV has been reported from Nigeria, Kenya, Tanzania, Togo, Mali, Gambia, Niger and Bénin. The type

isolate ('S.B.') used for an early description of the virus was reportedly obtained from Surinam, South America, and there is an inconclusive report of CYMV in Cuba.

CYMV is an RNA-containing virus, with isometric particles that are ~ 25 nm in diameter. Two kinds of nucleoprotein particles that are similar in size but differ in RNA content occur in infected plants. 'Top component' particles void of RNA are also produced by most isolates.

The RNA species in different particle types represent separate parts of the viral genome and the 'middle' (M) and 'bottom' (B) nucleoprotein components contain 25 % and 36 % RNA, respectively. The separated nucleoprotein components are not infective, but mixtures of M and B components are infective. CYMV is the type member of the comovirus group.

## 3 Cowpea aphid-borne mosaic potyvirus (CAbMV)/ Blackeye cowpea mosaic virus (BICMV)

**Cowpea aphid-borne mosaic virus (CAbMV)** was first described from Italy. Symptoms due to infection by CAbMV include severe mosaic, with the severity dependent on host cultivar and virus strain. Infected plants show dark green vein-banding, leaf distortion, blistering, and stunting.

Symptoms of the isolate first described from Italy — the so-called 'European strain' consist of a severe distorting mosaic in cowpea. An isolate first described from Kenya which induces an irregular, angular broken mosaic, has been referred to as the 'African strain'.

Another isolate from East Africa described as the 'African vein-banding strain' induces a broad dark green vein-banding. A third African isolate, referred to as 'African mild strain', induces a very mild mottle with little or no effect on plant growth.

**Blackeye cowpea mosaic virus (BICMV)** which is similar to CAbMV, was originally reported from Florida, USA. Systemic symptoms due to BICMV are severe mottling, distortion, yellowing, mosaic, and vein necrosis. CAbMV and BICMV are serologically related, but not identical, and cowpea varietal reactions to them differ.

In a recent study conducted in Australia, a tryptic digest of the coat protein of CAbMV-Morocco was compared with those of the coat protein of BICMV. Amino acid sequence analysis of peptides accounting for more than half of the coat protein confirmed that CAbMV-Morocco was a distinct member.

Comparison of nucleotide sequence data of the coat protein genes of strains of bean common mosaic virus (BCMV) and BICMV strongly suggests that BICMV is best regarded as a strain of BCMV as newly redefined.

Yield losses of 15–87 % due to infection by CAbMV have been reported from Iran and the complete loss of an irrigated cowpea crop in northern Nigeria was tentatively attributed to CAbMV.

However, there are strong indications that dual infection of CAbMV and cowpea golden mosaic virus probably caused the disease symptoms described in the latter instance.

CAbMV is readily transmitted by sap inoculation, and by aphids in a non-persistent manner. *Aphis craccivoria, A. gossypii, A. spiraecola, A. medicaginis, Macrosiphum euphorbiae, Myzus persicae, Rhopalosiphum maidis,* and *Cerataphis palmae* are reported as aphid vectors. CAbMV is seed-borne in cowpea, but seed transmission depends on the virus strain and cowpea cultivar.

CAbMV/BlCMV has been reported from various countries in Africa: Kenya, Nigeria, Morocco, Tanzania, Uganda, Zambia, Egypt, Togo and Botswana. Because of its seed-borne nature, CAbMV/BlCMV probably has a world-wide distribution.

In surveys throughout Nigeria, both CAbMV and BICMV have been found in all ecological zones. It is now considered to be the most widespread and important virus disease of cowpea in Nigeria. CAbMV and BICMV are characterized by flexuous, filamentous particles, which are ~ 750 nm long. The virus belongs to the potyvirus group.

## 4 Cowpea mottle virus (CMeV)

Although symptoms of CMeV in cowpea generally resemble those caused by CYMV, infection is often manifest as bright yellowing. In tolerant varieties, symptoms usually consist of mottling only.

CMeV was first described from Nigeria and it was isolated from bambarra groundnut *(Vigna subterranea)* and cowpeas. Cowpea yield reductions of more than 75 % have been reported from Nigeria, whereas 65 % reduction is estimated in Côte d'Ivoire where it is considered a significant disease.

CMeV is readily transmitted by sap inoculation. A chrysomelid beetle vector is *Ootheca mutabilis* Sahlb., which acquires the virus within 10 minutes, transmits it within 1 hour, and remains infective for at least 5 days.

Another chrysomelid beetle *(Medythia quaterna* Fairmaire) also transmits CMeV to cowpea, but less efficiently than *O. mutabilis*. Recently, a new chrysomelid beetle vector, *Monolepta tenuicornis* Jacobi, has been reported from Côte d'Ivoire.

Robertson (1966) failed to detect seed transmission of CMeV through many thousands of seeds harvested from infected cowpea plants. By contrast, Shoyinka and others (1978) recorded up to 10 % seed transmission from naturally infected cowpea and up to 7 % from artificially inoculated cowpea.

Subsequent studies with five cowpea cultivars failed to detect a greater than 0.4 % seed transmission. Robertson (1966) reported 10 % seed transmission of CMeV for bambarra groundnut; but this has never been confirmed.

Geographically, within Nigeria, CMeV is most commonly found in the riverine area of the 'middle belt', which has a southern guinea savanna climate and is where most of the bambarra groundnut is grown. CMeV has recently also been reported from Côte d'Ivoire, Bénin and Togo.

CMeV particles are isometric and measure ~ 30 nm in diameter. They contain single-stranded RNA, which sediments as a single component.

CMeV is distinct from other beetle-transmitted cowpea viruses, such as cowpea chlorotic mottle, cowpea yellow mosaic, cowpea severe mosaic, and southern bean mosaic viruses. CMeV is not yet assigned to a particular virus group, but may belong to the carmovirus group.

## 5 Cucumber mosaic cucumovirus (CuMV)

Diseases of cowpea caused by CuMV have been described from various countries. Systemic symptoms are mild mottle, mosaic, and distortion, often with characteristic ringspots. A few varieties develop severe mottle, distortion, and considerable reddish vein necrosis. Symptoms in most varieties are mild.

CuMV has been reported to cause yield reductions of 14 % in cowpea in the USA. The virus was first described on cowpeas in Nigeria by Robertson (1966).

CuMV is sap-transmissible and is transmitted by aphids in a non-persistent manner. The aphid vectors include: *Aphis craccivora*, *A. euonymi*, *A. fabae*, *A. gossypii*, and *Myzus persicae*.

CuMV has also been shown to be seed-borne at high rates (up to approximately 15 %) in many different cowpea genotypes.

CuMV has isometric particles, ~ 28 nm in diameter, containing single-stranded RNA with a tripartite genome. It belongs to the cucumovirus group.

## 6 Southern bean mosaic sobemovirus – cowpea strain (SBMV)

Field occurrence of southern bean mosaic virus (SBMV) on cowpea has been reported from the USA, India, Ghana, Nigeria, Côte d'Ivoire, Senegal, Bénin and Togo.

Systemic symptoms include vein-clearing, followed by a mild to severe mottling or coarse mosaic leaf pattern. SBMV is readily transmitted by sap inoculation. It has been transmitted to members of the Leguminosae family only. The bean leaf beetle, *Ceratoma trifurcata* Forst (Fam.: Chrysomelideae) is an efficient vector of SBMV.

In laboratory studies, SBMV was transmitted by *Ootheca mutabilis,* which retained the virus for 13 days following 24 hours acquisition feeding.

SBMV was isometric particles, 28-30 nm in diameter, and contains a single-stranded RNA. It is the type-member of the sobemovirus group.

## 7 Cowpea golden mosaic virus (CGMV)

In 1977 a so-called golden mosaic' disease was first discovered in cowpea grown at Onne, near Port Harcourt, in southeastern Nigeria. It was shown to be transmissible only by the whitefly *Bemisia tabaci* and not by sap inoculation or through seed. Infected cowpea plants show bright yellow patches on their leaves and, in severe cases, the entire leaf surface may turn bright yellow.

There are descriptions of similar diseases of cowpea that are whitefly-transmitted and not sap-transmissible from other countries in Africa, and elsewhere. These include 'cowpea yellow fleck' from India and 'cowpea bright yellow mosaic' from Pakistan.

A similar disease has been reported in Kenya, Tanzania, and Niger. A 'golden mosaic'-like disease has also been reported to occur in Mauritania, Senegal, and Mozambique.

Also, a whitefly-transmitted cowpea disease has been reported from Brazil. These diseases may all be caused by similar or identical viruses.

So far, no information is available on the virus particles of any of these diseases. However, recently a geminivirus was purified from plants infected with 'cowpea yellow fleck' from India following virus assays at each step in purification. This was done using monoclonal antibodies to African cassava mosaic virus (ACMV) which can detect other whitefly transmitted geminiviruses.

However, the cowpea golden mosaic-infected samples from Nigeria gave only a weak reaction, if at all, with monoclonal antibodies to ACMV specific to whitefly-transmitted geminiviruses.

## 8 Cowpea mild mottle carlavirus

Cowpea mild mottle virus (CMMV) was first reported from Ghana. It has subsequently been found in Nigeria, Togo and Côte d'Ivoire from both cowpea and soybean.

Naturally infected cowpea plants may exhibit a mild systemic mottle but are mostly symptomless. On artificial inoculation, plants of susceptible cowpea cultivars may develop necrotic lesions on primary leaves and severe systemic chlorosis and necrosis on trifoliate leaves.

CMMV is considered to be a threat to the successful production of other leguminous crops, such as groundnut *(Arachis hypogea)*, pigeonpea *(Cajanus cajan)*, and Jack beans *(Canavalia ensiformis)*, all of which are at times intercropped with cowpeas in Ghana.

CMMV isolates are transmitted by the whitefly, *Bemisia tabaci*, either in a semi-persistent (soybean isolate) or in a non-persistent manner (peanut isolate).

CMMV is reported to be seed-borne in cowpea, soybean, and French bean. Seed transmission in cowpea and soybean was greater (90 %) than in French bean (15 %). However, recent studies at IITA have failed to detect any seed transmission of CMMV in several soybean genotypes tested.

CMMV has straight to slightly flexuous, fragile filamentous particles of ~ 650 nm long. It has been classified as a carlavirus. The virus is considered at IITA to be of little significance to cowpea as only very few cowpea genotypes are susceptible.

## 9 Sunn-hemp mosaic tobamovirus (SHMV)

Cowpea diseases caused by tobamoviruses have been variously described in different countries. These include 'cowpea chlorotic spot', 'Catjang mosaic', 'nylon cowpea seed-borne mosaic' from India; 'cowpea mosaic' from the USA and legume or cowpea strain of tobacco mosaic (TMV-CS) from Nigeria.

All have been reported to be caused by, or related to, the sunn-hemp mosaic virus (SHMV), which is a tobamovirus.

SHMV usually causes only a systemic mosaic, vein yellowing and mild green mottle in cowpea. The virus is represented by rigid, rod-shaped particles, 300 nm long and contains single-stranded RNA. No vector has been reported. Recently, at IITA, SHMV was detected in the cover crop *Mucuna pruriens* var. utilis.

In one particular field plot almost all the plants were infected with the virus. So far, this virus has been detected only in very few field samples among several hundreds of cowpea samples collected from all over Nigeria over several years. It is considered at IITA as a curiosity rather than a virus of potential importance to cowpea.

## 10 Identification and separation of cowpea viruses

Cowpea viruses are identified by their intrinsic properties; the plants they infect and the symptoms they cause; the vectors which transmit them and the mode of transmission; the size, structure, and composition of their particles as well as serological affinities.

The sophisticated equipment and expertise required for advanced techniques of virus characterization are currently available and in general use in few laboratories in tropical Africa.

However, based on the available knowledge of cowpea viruses in Africa, even if facilities are inadequate for sophisticated studies, viruses may now be identified by using simple serological methods, for example, agar-gel diffusion tests, and inoculation to test plants (Figure 1). Vector transmission studies may be used to complement such tests.

For example, if aphid transmission is successful, the virus is cowpea aphid-borne mosaic or cucumber mosaic virus or something entirely new. They can be distinguished by the fact that only CuMV infects *Nicotiana glutinosa* producing systemic symptoms. Similarly, only two viruses are whitefly-transmitted, and of these cowpea mild mottle virus is sap transmissible, whereas cowpea golden mosaic is not.

The three beetle-transmitted virus can be easily identified by simple agar-gel diffusion tests using antisera obtainable from IITA. The only remaining virus is sunn-hemp mosaic virus which can be easily identified by inoculation to *Nicotiana glutinosa* where only necrotic local lesions are produced with no systemic infection.

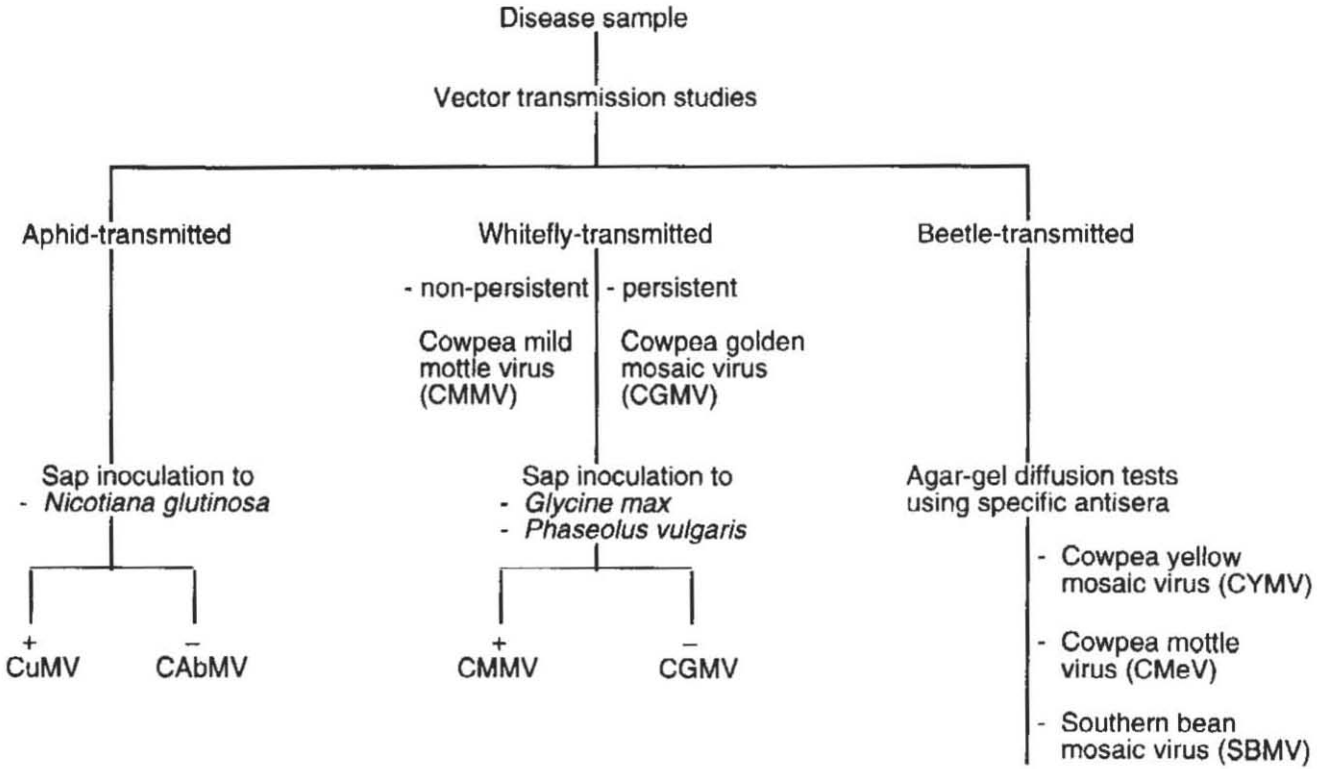


**Figure 1.** Possible scheme for identification and separation of cowpea viruses reported from Africa.

Wherever vector transmission studies cannot be carried out, a simple procedure is suggested for cowpea virus identification. Samples should first be used in agar-gel diffusion tests using antisera to the three beetle-transmitted spherical viruses. If negative, the samples should be inoculated to cowpea (preferably of a variety in which symptoms are observed), soybean *(Glycine max),* French bean *(Phaseolus vulgaris),* and *N. glutinosa.*

CuMV and SHMV can be separated by the fact that SHMV causes local lesions on *N. glutinosa*; whereas CuMV produces systemic infection. CMMV may be identified if the virus being tested induces conspicuous symptoms in soybean and French bean.

If cowpea only is infected, the virus is very likely to be CAbMV. However, CAbMV produces in most cases characteristic green vein-banding symptoms in cowpea which itself is quite diagnostic. If a sample does not infect any of the above listed hosts by sap inoculation, but the original symptoms are a characteristic golden or bright yellow mosaic, then it is likely to be CGMV.

## 11 Control of cowpea virus diseases

Efforts to control virus diseases of cowpea may involve one or more measures intended to reduce sources of infection. This can be achieved by using virus-tested seed. Roguing diseased plants may also be effective.

The use of insecticides to prevent virus transmission by insect vectors has only been partially successful because most insect vectors would normally have transmitted the virus before they are killed by insecticides. Use of insecticides, however, may be considered not to represent a sustainable solution to control of virus diseases.

The best single control method is the use of resistant varieties. The first step towards developing such varieties is large-scale screening and selection among germplasm collections of the crop, followed by breeding new crop genotypes, where possible, that combine virus resistance with other useful traits. In general, however, no single measure can totally prevent the occurrence and spread of virus diseases. For profitable cultivation all measures that can be feasibly integrated should be considered.

Although eight viruses are reported from cowpeas in Africa, only two, viz. cowpea aphid-borne mosaic virus and cowpea yellow mosaic virus, are considered to be very important as far as geographical distribution, pathogenic variation and yield loss are concerned.

Cowpea mottle, southern bean mosaic, cowpea golden mosaic and cucumber mosaic viruses seem to be of localized importance. Cowpea mild mottle and sunnhemp mosaic viruses are currently not considered sufficiently important to warrant attention in a breeding programme.

Through screening of potential breeding parents from the world germplasm collection of cowpea maintained at IITA, a number of accessions were identified which had either individual or combined resistances to several viruses. IITA has already started distributing to various cooperating scientists in the national programmes multiple virus-resistant breeding lines.

IITA is also distributing a set of cowpea breeding lines which is more specifically designed to function as a 'field-indicator' set of accessions. Whereas such accessions had been selected at IITA for their general resistance to viruses, their usefulness as 'field-indicators' is described from selected susceptibility to certain viruses, or virus strains.

It is hoped that, with the active collaboration of national programme scientists, it will be possible to identify cowpea lines which are locally adapted and also show multiple virus resistance under their local conditions.

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## 13 Suggestions for trainers

If you use this Research Guide in training ...

**Generally:**

- Distribute handouts (including this Research Guide) to trainees one or several days before your presentation, or distribute them at the end of the presentation.

- Do not distribute handouts at the beginning of a presentation, otherwise trainees will read instead of listen to you.

- Ask trainees not to take notes, but to pay full attention to the training activity. Assure them that your handouts (and this Research Guide) contain all relevant information.

- Keep your training activities practical. Reduce theory to the minimum that is necessary to understand the practical exercises.

- Use the questions on page 4 (or a selection of questions) for examinations (quizzes, periodical tests, and so on). Allow consultation of handouts and books during examinations.

- Promote interaction of trainees. Allow questions, but do not deviate from the subject.

- Respect the time allotted.

**Specifically:**

- Discuss with trainees about experiences and problems of virus diseases of cowpea (10 minutes).

- Present and discuss the content of this Research Guide, considering the study materials listed on page 3 (1 ½ hours).

  Have real samples, diseased plants and virus vectors available for each trainee.

- Conduct the practicals suggested on page 3 in groups (3-4 trainees per group; 2 hours). Make sure that each trainee has the opportunity to practice. Have resource persons available for each group and practical.

  Organize your practicals/demonstrations well. Keep trainees busy. Prevent trainees from scattering around the field.

  You may have to prepare several steps of virus identification methods in advance. Also, you may have to spread the practicals over several days.

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*The International Institute of Tropical Agriculture (IITA) is an international agricultural research center in the Consultative Group on International Agricultural Research (CGIAR), which is an association of about 50 countries, international and regional organizations, and private foundations. IITA seeks to increase agricultural production in a sustainable way, in order to improve the nutritional status and well-being of people in tropical sub-Saharan Africa. To achieve this goal, IITA conducts research and training, provides information, collects and exchanges germplasm, and encourages transfer of technology, in partnership with African national agricultural research and development programs.*

*L'Institut international d'agriculture tropicale (IITA) est un centre international de recherche agricole, membre du Groupe consultatif pour la recherche agricole internationale (GCRAI), une association regroupant quelque 50 pays, organisations internationales et régionales et fondations privées. L'IITA a pour objectif d'accroître durablement la production agricole, afin d'améliorer l'alimentation et le bien-être des populations de l'Afrique tropicale subsaharienne. Pour atteindre cet objectif, l'IITA mène des activités de recherche et de formation, divulgue des informations, réunit et échange du matériel génétique et encourage le transfert de technologies en collaboration avec les programmes nationaux africains de recherche et développement.*

*O Instituto Internacional de Agricultura Tropical (IITA) é um centro internacional de investigação agrícola pertencendo ao Grupo Consultivo para Investigação Agrícola Internacional (GCIAI), uma associação de cerca de 50 países, organizações internacionais e regionais e fundações privadas. O IITA procura aumentar duravelmente a produção agrícola para melhorar a alimentação e o bem-estar das populações da Africa tropical ao sul do Sahara. Para alcançar esse objetivo, o IITA conduz actividades de investigação e treinamento, fornece informações, reúne e troca material genético e favorece a transferência de tecnologias en colaboração com os programas nacionais africanos de investigação e desenvolvimiento.*

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