Pod Borer Resistant COWPEA

AATF
PROSPERITY THROUGH TECHNOLOGY

WHY IS COWPEA IMPORTANT FOR NIGERIA?

FAQs: ALL YOU NEED TO KNOW

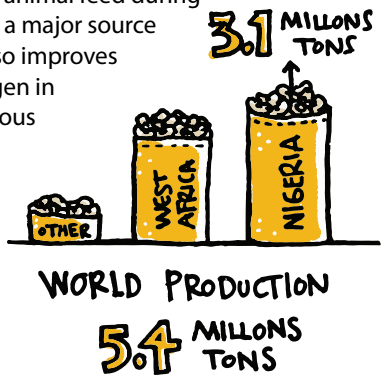
WHY DO WE NEED POD BORER-RESISTANT COWPEA?

Farmers and scientists in Africa identified legume pod borer *(Maruca vitrata)* as one of the most damaging insect pests limiting cowpea production. The damage caused by the pod borer to cowpea plants reduces the size and quality of the cowpea harvest. It can reduce grain yield by up to 80%. Farmers typically spray pesticides up to 6-10 times within a planting season in an attempt to control this insect pest. Farmers currently rely on the use of chemical pesticides to control this and other pests, but this is often not effective because the chemicals do not reach the pest larvae inside the plant tissues.

The chemicals are also expensive, their availability to farmers is limited, and due to inadequate training in their use, often lead to unintended human health and safety impacts. A cowpea product that can protect itself from legume pod borer damage will make it easier and cheaper for farmers to produce cowpeas in areas where this pest is a problem.

WHY IS COWPEA IMPORTANT FOR NIGERIA?

More than 95 percent of the world's cowpea production comes from West Africa. Nigeria is Africa's biggest producer of cowpea, also known as beans, with an estimated grain production of 3.1 million tons annually. This accounts for more than 58 percent of the world total output of 5.4 million tons. Nigeria is also the world's biggest consumer, requiring some 3.6 million tons of cowpea annually, including imports from neighboring countries, Niger, Cameroon and Burkina Faso. More than 95 percent of the world's cowpea production comes from West Africa. Cowpea seeds are an important source of protein in the diet of many rural and urban Nigerians. It is also rich in potassium and provides calcium, magnesium, phosphorous, thiamine, riboflavin, niacin pantothenic acid and vitamins A, C and B6. The fodder is an important animal feed during the dry season, generating a major source of income for farmers. It also improves soil fertility as it fixes nitrogen in the soil. Cowpea is indigenous to Africa, tolerating sandy soil and low rainfall. It is the most widely planted native legume in Africa.

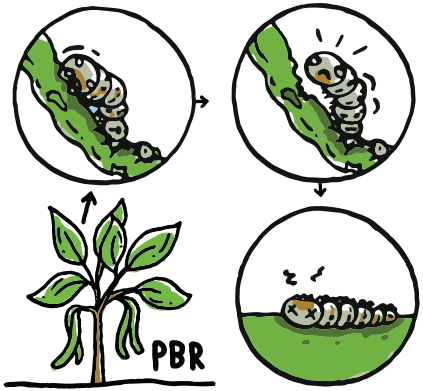


WHAT IS POD BORER-RESISTANT (PBR) COWPEA?

PBR cowpea is a cowpea (bean) variety with built-in resistance to the legume pod borer *Maruca vitrata* that destroys the crop while in the field. The resistance gene is from a common soil bacterium known as *Bacillus thuringiensis* (Bt) that greatly reduces the need for pesticide sprays. The *Bt* protein is lethal to the pod borer and some other lepidopteran insect pests but safe for humans, animals and beneficial insect species. The bacterium is frequently used as a pest control spray in organic agriculture. The *Bt* gene was introduced into PBR cowpea through genetic engineering. This research was conducted over a span of 10 years to ensure the crop is both effective against *Maruca* and safe for humans, livestock and the environment.

HOW DOES *BT* INSECT PROTECTION WORK IN COWPEA?

The gene from *Bacillus thuringiensis*, *Bt* for short, gives PBR cowpea the ability to defend itself against *Maruca*. The *Bt* gene produces a protein that stops the functioning of the digestive system of the legume pod borer larva, which eventually dies. This protein does not affect non-target organisms and as such, is safe to humans, livestock, wildlife and beneficial insects. The *Bt* bacterium is sold under different names and has been used in organic farming for over 50 years to control insect pests.



WHAT ARE THE BENEFITS OF PBR COWPEA?

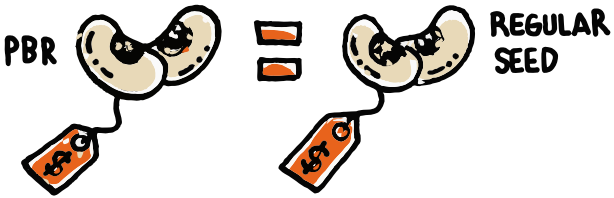
PBR cowpea will provide better seed choices to farmers and help them produce more reliable harvests and better grain quality. The cowpea will reduce pesticide use from an average of six-to-eight applications during a growing season to two, which will reduce production costs for farmers and benefit both human and environmental health. Farmers who have no access to pesticides will be able to protect their grain yield through use of improved PBR cowpea seed alone. With reduced grain yield losses, cowpea production will increase by at least 20 percent. Higher and betterquality production will improve the livelihoods of smallholder farmers and contribute to increased trade. Farmers will be able to harvest enough to feed their families and have a surplus that they can sell to increase their incomes,which helps strengthen local communities.

HOW AND WHEN WILL FARMERS GET ACCESS TO PBR COWPEA SEED?

The seed will be produced and distributed to farmers using existing and new seed distribution channels. These channels will help ensure that good quality PBR cowpea seed is available when farmers need it. PBR cowpea will be provided to seed companies with the capacity to produce and distribute certified seeds. When sold through official seed distributors, the seed will be certified. The developer will apply for variety registration and release as per the National Variety Release rules and regulations before carrying out participatory on-farm demonstration trials with farmers. It is expected that farmers will have access to the seeds for planting from year 2020.

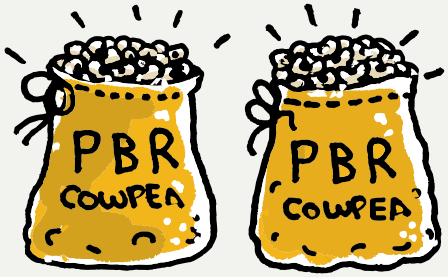
HOW MUCH WILL PBR COWPEA COST?

The PBR cowpea will be sold at the regular price of cowpea seed depending on the market dynamics of demand and supply. The cowpea will be royalty-free to seed companies who will then distribute to farmers at competitive market prices.



WILL PBR COWPEA BE PLANTED THE SAME WAY AS TRADITIONAL COWPEAS AND DO THEY NEED MORE INPUTS?

PBR cowpea will be planted in the same way as traditional cowpeas. As with any other crop, farmers will be encouraged to follow the best agricultural management practices to maintain high yields by controlling weeds and adding inputs such as fertilizer and water. Planting guidelines to ensure insect resistance management will be provided.

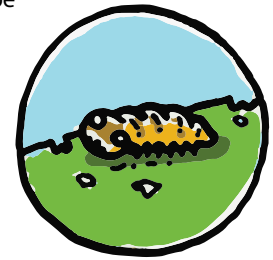


WILL FARMERS BE ABLE TO SAVE PBR COWPEA SEEDS FOR REPLANTING?

Yes, farmers will be able to save seed for replanting if they wish. However, just as with traditional seed, it is good farm management practice to plant the best available seed each year to help ensure consistently good harvests. This will protect the crop from failures caused by loss in seed quality and the presence of viruses, which increase each time seed is saved and replanted.

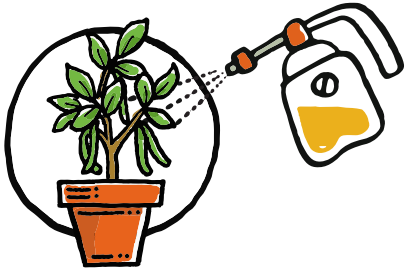
WILL THE *MARUCA*-RESISTANT GENE CONTROL ALL INSECT PESTS OF COWPEA?

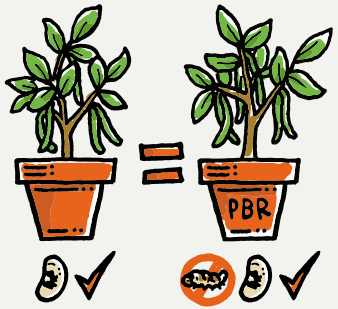
The protection in PBR cowpea is effective against legume podborer *(Maruca vitrata)* and some other caterpillar pests of cowpea. It will not be effective against all cowpea pests. However, planting guidelines that include recommendationson integrated pest management (IPM) will be provided to farmers.



WILL I STILL NEED TO USE PESTICIDES ON PBR COWPEA?

If *Maruca* is the only pest that damages your cowpea crop, then no pesticide will be needed when growing PBR cowpea. However, if other pests are a problem, which is likely, some pesticide use will be necessary to protect the crop from these other pests. But the number of sprays will be fewer than usual. Farmers are encouraged to speak to their extension agents for advice on the best type of pesticide to apply.

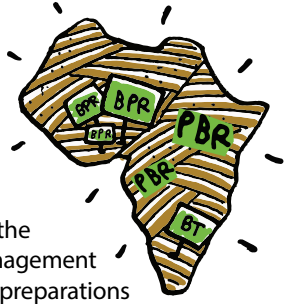




DOES PBR COWPEA YIELD BETTER THAN CONVENTIONAL VARIETIES?

The insect resistance trait will be integrated into conventional varieties that have good yield under local growing conditions. The addition of the insect resistance trait will protect cowpea varieties from yield loss due to *Maruca* infestation. Therefore, under high *Maruca* infestations the *Maruca*-resistant cowpea will yield better than a conventional variety that lacks protection against the pest. In general, insect resistance traits protect the plant from yield loss to plant-feeding insects like the pod borer *Maruca*. However, where pod borer is not a problem for cowpea production, PBR cowpea will not provide significant yield advantage.

HAS PBR COWPEA BEEN PLANTED ANYWHERE ELSE?



Bt crops such as *Bt* maize have been in the market for nearly 20 years, with more than 25 countries growing it today on 106 million hectares. However, PBR cowpea has not been commercially grown anywhere in the world. The permit granted by the National Biosafety Management Agency of Nigeria allows the developer to proceed with preparations for commercial production of cowpea by farmers in Nigeria. Trials for the PBR cowpea are going on in other African countries, including Ghana and Burkina Faso. Similar *Bt* products however are approved and in use in various regions of the world. In 2016, a record 185. 1million hectares of biotech crops were grown globally — an increase of 5.4 million hectares from 2015 and more than a 100-fold gain since 1.7 million hectares were planted in 1996. In South Africa, an estimated total of 2.73 million hectares of *Bt* maize were planted in 2014.

WILL THE *BT* GENE PROTECT STORED SEED?

The main storage pests of cowpea seeds and grains are bruchids, which are not controlled by the *Bt* protein. However, an integrated approach will be used to ensure protection of the improved cowpeas both in the field and during storage.

WILL THE PEST DEVELOP RESISTANCE TO THE *MARUCA*-RESISTANT SEED?

As with all pest control measures, there is a possibility that the *Maruca* pest will develop resistance to the control measure. The developers will establish an insect resistance management strategy to help ensure that farmers have access to the insect resistance benefit for as long as possible. As in other countries, a key component of that strategy will involve the farmer. Farmers and extension officers will be trained in insect resistance management.

IS PBR COWPEA SAFE FOR THE ENVIRONMENT?

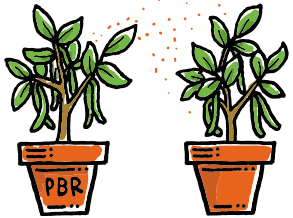
The *Bt* protein in PBR cowpea has been evaluated from an environmental safety perspective, including its potential to cause harm to pollinators such as honey bees. The *Bt* is very specific to certain insects and causes no damage to other classes of insects or animals, including pollinators. The protein has a narrow spectrum of toxicity towards lepidopteran insect pests, such as *Maruca*.

IS *PBR* COWPEA SAFE FOR PEOPLE TO EAT?

PBR cowpea is safe for both human and animal consumption. PBR cowpea has undergone extensive health and safety assessments as per the Nigerian and international scientific standards. The cowpea gets its insect protection ability from a common soil-dwelling bacterium, *Bacillus thuringiensis* (Bt). Many *Bt* crops have been safely deployed and used for over 20 years in various parts of the world and have a history of safe cultivation and consumption.

WILL PBR COWPEA CROSS POLLINATE WITH WILD COWPEAS?

Cowpea is a self-pollinating crop due to the nature of its flower structure, which means minimal chances of crossing with wild cowpeas. However, through the movement of insects or other unknown agents, cross pollination may take place, but only when plants are very close to each other. In that case, pollen movement into traditional cowpea plants is anticipated to occur at a low level. This is a natural occurrence with all flowering plants. The rigorous safety assessment carried out for both PBR cowpea consumption and the environment ensures that the result of pollen movement poses no safety concerns.



DOES NIGERIA HAVE THE ABILITY TO REGULATE GMOS?

The Nigerian National Biosafety Management Agency (NBMA) is the competent national authority for the regulation of GMOs. Nigeria has a National Biosafety Management Agency Act 2015 in place that empowers the NBMA with the responsibility to provide a regulatory framework and an institutional and administrative mechanism for safety measures in the application of modern biotechnology in Nigeria with the view to preventing any adverse effect on human health, animals, plants and environment. As of February 2019, the NBMA had successfully reviewed and issued about nine permits for confined field trails; two commercial release permits and a number of import permits. The Agency has staff that have been well trained both nationally and internationally on diverse biosafety related matters and has also established a state-of-the-art GMO Detection and Analysis Laboratory. In addition, the Agency has developed the necessary regulatory instruments to enhance its capability for its duties.

WHAT IMPACT WILL PBR COWPEA HAVE ON COUNTRY EXPORTS?

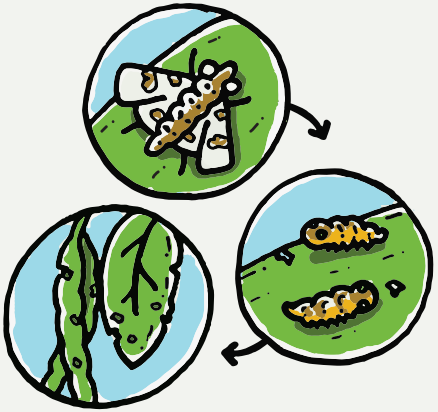
Maruca-resistant cowpea production will not affect the export of other crops but importing countries may require cowpea exporters to indicate whether or not the exported crop is genetically modified. Exporters will need to notify receiving countries when exported cowpeas are genetically modified. These countries may require a safety assessment before the cowpeas are imported.

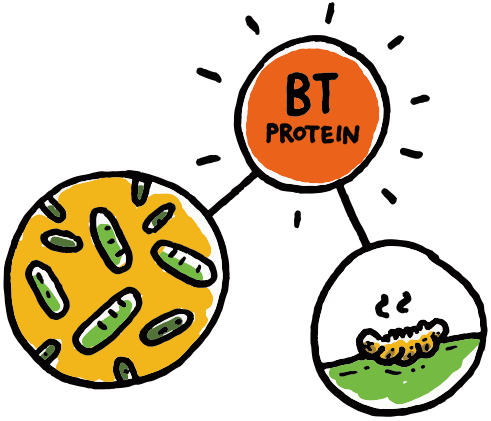
WILL PBR COWPEA COOK IN THE SAME WAY AS CONVENTIONAL COWPEAS?

Yes, PBR cowpea is expected to cook in the same way and taste the same as conventional cowpeas. The only change in *Maruca*-resistant cowpea is the addition of two proteins, proteins, neither of which interferes with cooking nor changes the way the cowpeas must be cooked. Before the cowpeas are sold, however, culinary testing will be used to ensure that the taste and cooking qualities are unchanged and acceptable.

WHAT IS *MARUCA* POD BORER?

The *Maruca* pod borer is an insect pest that attacks cowpea plants and many legume crops in Africa and other countries in the World. The *Maruca* moths lay eggs on cowpea plants and the emerging caterpillars feed on the plants and burrow into the pods. This damage affects the quantity of the leaves and flowers and the quantity and quality of grains, leading to severe yield loss. Pesticides to control *Maruca* are expensive and are not always available. This results in some farmers using unapproved chemicals to protect cowpea crops, and other farmers having to tolerate the damage because they do not have any effective way to control *Maruca*.





WHAT IS *BT*?

Bt is an abbreviation for *Bacillus thuringiensis*, a soil bacterium that is common around the world. These bacteria produce specialised proteins, called *Bt* proteins, that selectively kill certain types of insects without affecting other living organisms. As such, *Bt* have been and still are used as biological control agents for certain insect pests in farming, especially for the organic food industry. Modern biotechnology has produced *Bt* crops that are modified to produce specific *Bt* proteins in the plant cells to protect against specific pests. These crops do not need conventional pesticide sprays to destroy the pests that are controlled by the specific *Bt* protein. Existing, approved Bt crops have significantly improved the cost effectiveness and sustainability of crop production in North and South America, Europe, Africa, Asia and Australia.

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FOR MORE INFO:

Dr. Abdourhamane Issoufou Kollo
African Agricultural Technology Foundation (AATF);
Email: I.Abdourhamane@aatf-africa.org
Phone: +234 94605480/ +238 8163964686

Professor Mohammad F. Ishiyaku,
Institute for Agricultural Research,
Ahmadu Bello University, Samaru, Zaria
E-mail: mffaguji@hotmail.com,
Phone: +2348051316887