FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA

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(Weed Science)

INAUGURAL LECTURE SERIES 21

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Introduction

My interest to study agriculture arose naturally from my growing up on the farm, my passion to study weeds was due to dearth of weed scientists in Nigeria, which is still probably the case today over two decades on, and my desire to work on *Striga* was premised on the enormous crop yield losses they cause to the helpless Nigerian farmer who is compelled to grow crops in *Striga*-sick field. Were there weeds in the beginning? No, in the beginning there were no weeds because humans were few and were hunter-gatherers before the advent of selection, domestication and cultivation of crop plants which started about 9500 BC. The sedentary nature of agriculture changed due to expansion in human population up to the carrying capacity of land which in turn also changed with time. Spore (2010) posited that the trend of world population is that it was five million when man first began farming, however today five million people are born every 10 days worldwide. Furthermore, from the beginning of agriculture it took about 10,000 years for the world population to reach its first billion, but the second billion was hit in 130 years in 1927 (Spore, 2010). Today, 84 years after, the world population is about 6.9 billion. Two pertinent questions to ask at this juncture are: Does food supply increase proportionately with human population? How can this massive number of people be fed? To my immediate domain, which has an annual population growth rate of about 2%, Nigeria is faced with the reality of feeding her teeming population which can result into crisis if the current situation is not properly addressed.

The food crisis in Africa is multidimensional. Apart from climatic factors that militate against crop production in any part of the world, weeds are the most important. The adverse effect of weeds is equal to that of all other factors combined and they cause about 30% yield losses in crops in developing countries. Furthermore, African farmers spend about 40% of their time removing weeds from their crops while their counterparts in the developed world spend less than 10% (Lagoke *et al.*, 1991). Weed problems in the tropics have been compounded by recent climate change. Weeds can be classified on the basis of growth habit into free-living (autotrophic) and those dependent on other plants for survival are parasitic (heterotrophic). The problem of parasitic weeds in crop production differs significantly from that caused by other weeds because of the close biological association of parasitic weeds with the host crop plants which makes them special weed problems.

This lecture focuses on the parasitic witchweed (*Striga* spp.). The witchweed constitutes one of the most important biotic constraints to the production of cereal food crops in Africa and it can cause yield losses of up to 100% in cereals. *Striga* is one of the problems reducing crop yield and directly marginalizing capacity for crop production in Africa thereby threatening her food security.

Of the 40 witchweed species worldwide, 28 are found in Africa and of this number five species cause significant damage to crops. The centre of origin of *Striga* is Africa between the Semien Mountains of Ethiopia and the Nubian hills of Sudan (Ejeta, 2011). This area is also recognized as the centre of origin for sorghum and millet which are heavily parasitized by the weed. It is of great concern that all the five species of *Striga* causing serious damage to cereal crops are found in Nigeria. These are:

(I) *Striga hermonthica* (Del.) Benth.
(ii) *S. asiatica* (L.) Kuntze.
(iii) *S. aspera* (Willd.) Benth.
(iv) *S. forbesii* (Benth.)
(v) *S. gesneriodes* (Willd.) Vatke.

While the first four species attack cereal crops (rice, maize, sorghum, millet, hungry rice and sugarcane) the last one attacks leguminous crops (groundnut, cowpea) and *Striga hermonthica* is the most serious in sub-Saharan Africa. Why the name witchweed? The term "witch" in this context expresses the magical and mysterious manner in which the weed damages the host crop, even before it becomes visible above the ground. Across Africa farmers ascribe local names to *Striga* that so correctly translates to effects of humans under evil spirit attack. For example, it is called "wuta wuta" in Hausa language in Nigeria. While the weed is still underground it causes the crop to suddenly become sickly, obviously bewitched. *Striga*'s dramatic bewitching effect and dreadful affliction on crops is recognized by farmers more as a scourge. The *Striga* problem has been a major reason why crop productivity has remained at or below subsistence, leaving farmers with no way out of a situation that is only getting worse.

Description of the Witchweed

For you to appreciate the role I have played in the battle against the witchweed it is appropriate for you to know the characteristics of the weed. *Striga hermonthica* is the largest of the witchweed species, usually at least 30-40 cm tall. The flowers are very striking and beautiful, usually

purple in colour but variable, but the plant is deadly in attack (Figure 1). Someone saw a field of sorghum heavily infested with *Striga* and remarked: "who planted these beautiful flowers in this bush?" A parasitic plant is one which depends on another for part or all of its nutrition. The weed attaches itself to the host crop plant through their roots and feed on the host nutrients from the soil and food from the atmosphere thereby causing the crop to be stunted in growth which leads to reduced yield. The witchweed is a hemi-parasite because it has the ability to partially manufacture its food, being chlorophylous. However, it is an obligate root parasite because it cannot establish and develop independently. It is a C3 plant of the Orobanchaceae (formerly Scrophulariaceae) family that parasitizes C4 monocotyledonous hosts of the Poaceae family. In this lecture the terms "*Striga*" and "witchweed" will be used interchangeably.

Fig. 1: The witchweed (*Striga hermonthica*) in flowering stage