BREEDING ACTIVITIES IN AFRICA

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The last workshop for bean breeders in Eastern Africa was held at CIAT, Cali, Colombia in November 1983, in collaboration with the Title XII bean/cowpea Collaborative Research and Support (CRSP) programme. Since that time considerable progress has been achieved in developing regional collaboration in bean breeding in Eastern and Southern Africa. This workshop provides an opportunity to evaluate progress and further develop strategies for bean improvement.

In this paper I am going to concentrate on the Great Lakes Regional Programme, as the oldest bean network since CIAT began working in Africa.

Beans are a major food crop in the Great Lakes Region. In Rwanda the production of beans has increased in the twenty years since 1965 from 70,000 tons to 310,000 in 1985, due mainly to area increases, but also to intensification. In Burundi, production amounts to approximately 200,000 t and in the Kivu region of Zaire production is about 150,000 t.

Collaboration in bean improvement among the three countries has resulted in an integrated scheme of variety evaluation. The nucleus of this scheme is the PRELAAC (Pépinière Régionale pour l'Evaluation des Lignées Avancées de l'Afrique Centrale') nursery, which brings together the varieties entering the comparative yield trials ('Essais Comparatifs') in each country. The first PRELAAC was distributed in 1987. The purpose of the nursery is to evaluate specific traits, such as resistance to diseases or pests, in a range of suitable locations.

A meeting was held in August 1988 to review the results of the 1988 PRELAAC before the planting season. Rapid compiling of the data is critical, since it allows the information to be used by national programmes for selecting the varieties which go into their multilocational yield trials. At the same time, the meeting allows participating scientists to select the varieties for the regional yield trials (ERGL = 'Essais Régionaux des Grands Lacs'). These normally consist of 14 varieties and 2 controls in a 4 x 4 triple lattice design. There are separate trials for bush and climbing types.

Varieties which show exceptional disease resistance, but

which may not meet other requirements for entering the ERGL, can enter the PRER (Pépinière Régionale pour l'Evaluation de la Resistance') which provides pathologists with the opportunity to evaluate the stability of the resistance and its suitability for use in the crossing programme. The PRER is, therefore, the nursery which provides sources of resistance for use in the breeding programmes of each national programme. The ERGL, on the other hand, provides national programmes with yield data over a wide range of environments to complement data from their own multilocational yield trials and ensure that only the best varieties are selected for on farm trials and variety release.

The varieties selected from the ERGL at the same time enter the AFBYAN ('African Bean Yield and Adaptation Nursery'), which allows them to be tested over a still wider range of environments, and ensures interchange of the best varieties between regional programmes.

Seed multiplications under protected conditions are carried out by the Regional Programme at Rubona, Rwanda, to ensure that only seed of the highest quality is distributed.

In the PRELAAC for 1988 a bush variety, A 321, showed combined resistance to BCMV, Anthracnose, Halo Blight and Ascochyta. XAN 68 was resistant to Ascochyta, Halo Blight and Angular Leaf Spot. Excellent resistance to Anthracnose was found in AND 303 and RWR 45. In climbers ZAV 83052 was resistant to BCMV, Anthracnose and Halo Blight. Resistance to BCMV and Halo Blight was found in ACV 83031, and promising resistance to Anthracnose was found in AFR 229 and VAMY-127-310-S5.

In the ERGL for 1988, the best bush varieties for yield were: PVA 15, PVA 1432, PVA 1438 and AND 303. The best climbers were AFR 13 and ZAV 83052. These varieties will pass to the AFBYAN, and should be candidates for variety release.

As improved varieties are selected, so breeding needs to concentrate on specific traits in order to deal with problems as they arise with the new varieties. The sub-projects are being developed for this purpose, so that expertise and facilities are developed in the region to screen and breed for specific traits. I will give several examples of this approach.

BCMV is a virus attacking beans which causes mosaic symptoms in susceptible varieties. The strains which have been identified in many countries of Africa, including Rwanda and Burundi, are often necrotic strains of the types known as NL-3 and NL-5. These are virulent strains which can cause 'black root' symptoms in varieties carrying the dominant 'I'

gene. Hence, breeding at ISAR, Rwanda, is concentrating on developing varieties which combine resistance to mosaic with resistance to black root. For example, GLB 1 is a new resistant line from a backcross with C 10, a high yielding but susceptible climber from Rwanda; GLB 6 is from a backcross with G2333, a high yielding and anthracnose resistant climber recently released in Rwanda. The source of BCMV resistance in both cases was ACV 83034.

Halo blight is a bacterial disease which has caused problems especially with seed multiplication of susceptible varieties. Races 3 and 1 (in order of importance) predominate in the Great Lakes Region. Resistance to these races is controlled by independent dominant genes. Selection at ISABU, Burundi, has resulted in the development of resistant lines, for example GLH 9, which is from a backcross with Kilyumukwe, a high yielding but susceptible bush variety. The source of resistance was G 76 ('Redkloud').

Similar programmes are underway for angular leaf spot (PNL, Zaire), anthracnose (ISAR, Rwanda), bean fly (ISABU, Burundi), ascochyta (ISAR, Rwanda). Other sub-projects include screening for improved nodulation for more efficient nitrogen fixation (ISAR, Rwanda), and farmer participation and artesan seed production (ISAR, Rwanda and CEDERU, Zaire).

Emphasis is being given to involving farmers at an earlier stage in the variety selection process, and it is hoped this will lead to improved variety adoption, especially when combined with appropriate methods of seed production at a local level.