Registration of Six Improved Germplasm Lines of Cowpea with Combined Resistance to Striga gesnerioides and Alectra vogelii

The International Institute of Tropical Agriculture (ITA) has developed and distributed 6 improved cowpea germplasm lines IT90K-59 (Reg. no. GP-253, PI 583496), IT90K-82-2 (Reg. no. GP-254, PI 632853), IT93K-693-2 (Reg. no. GP-255, PI 642158), IT97K-205-8 (Reg. no. GP-256, PI 642159), IT97K-499-35 (Reg. no. GP-257, PI 642160) and IT97K-819-118 (Reg. no. GP-258, PI 642161) to various national programs with combined resistance to two parasitic plants, Striga gesnerioides (Wild.) Vatke and Alectra vogelii Benth. Of these, two lines were developed by the partial backcross method using a local landrace, B 301 from Botswana, as the source of resistance to Striga and Alectra and the other lines were subsequently developed through regular hybridization and selection using the derived lines as resistant sources (Singh, 2002). Alectra vogelii is more prevalent in the northern Guinea Savanna and southern Sudan Savanna of West Africa as well as in east and southern Africa, whereas S. gesnerioides is mostly found in west and central Africa. Resistance to S. gesnerioides is controlled by a single dominant gene and resistance to A. vogelii is controlled by duplicate dominant genes which are different from the gene conferring S. gesnerioides resistance (Singh and Emechebe, 1992; Atokple et al., 1993; Singh et al., 1992). Therefore, transfer of resistance is more straightforward. Testing for resistance to both parasites was done in the screen house as well as in the field at relevant sites in West Africa and South Africa. The pedigrees and brief characteristics of individual lines are described below.

IT90K-59 is an F5 line from the backcross IT84S-2246-4/B301/IT88S-2246-4. The local B301 is a landrace from Botswana and IT84S-2246-4 resulted from the cross IT82D-716/IT81D-1026, and each of these parents were derived from the crosses TVx 6332/TVx 3236 and TVx 1193-9F/TvU 2027, respectively. TVx 6332 is derived from a three way cross TVx 1193-9F/TvU 2027/TvU 625. The parents of TVx 1193-9F are TVx 1190 and TvU 76, which are the cultivated varieties ‘V.U.5’ from Kenya and ‘Prima’ from Nigeria, respectively. TvU 2027 is a local line ‘Kano-8’ and TvU 625 is a selection No. A-10 from Nigeria. TVx3236 involves TVx 1509 and Ile Brown as its parents. TvU 1509 is selection No. H 27-1-1 and ‘Ile Brown’ is an improved variety from Nigeria. IT90K-59 is an early maturing variety (70 d to maturity) with semi-erect growth habit. It has purple pigmentation to the S. gesnerioides strain from Benin Republic. IT90K-59 has the same pedigree, but it is a medium maturing variety (75 d) with erect growth habit. Its pigmentation is mostly found in west and central Africa. Resistance to S. gesnerioides is controlled by a single dominant gene and resistance to A. vogelii is controlled by duplicate dominant genes which are different from the gene conferring S. gesnerioides resistance (Singh and Emechebe, 1992; Atokple et al., 1993; Singh et al., 1992).

IT90K-82-2 has the same pedigree as IT90K-59 except that it came from the reciprocal cross B301/IT84S-2246-4/IT84S-2246-4. It is earlier in maturity (about 65 d) with erect plant type and medium size leaves. It also has no purple pigmentation on the stems and leaf-joints and only the wing petals are purple. It is resistant to the major diseases and insect pests. It has brown medium size seeds (about 14 g 100 seeds-1), with a rough seed coat. On the basis of its superior performance and early maturity, it has been recommended for release in Nigeria (Singh et al., 2002).

IT93K-693-2 is an F6 selection from a three-way cross IT88D-867-11/IT90K-76//IT89KD-374-57. Of these, IT88D-867-11 is an F6 line derived from the backcross IT84S-2246-4/TN 5-78/TN 5-78. TN 5-78 is a local variety from Niger Republic. IT90K-76 is a sister line of IT90K-82-2 derived from the backcross B301/IT84S-2246-4/IT84S-2246-4. The other parent, IT89KD-374-57, is an F6 line derived from the backcross IT87F-1787-3/IT84S-2246-4/IT87F-1787-3. The IT87F-1787-3 is a pure line selection from the local landrace ‘Dan Ila’ from northern Nigeria. IT93K-693-2 is resistant to Alectra as well as all five strains of Striga reported in West Africa (Singh 2002). Its broad-based resistance has come from a combination of resistance in its parents. IT90K-76 confers complete resistance to S. gesnerioides in Burkina Faso, Cameroon, Mali, Niger, and Nigeria, but it has only moderate resistance to the strain from Benin Republic. The local variety, Dan Ila is completely resistant to the S. gesnerioides strain from Benin republic. IT93K-693-2 is an extra-early maturing (about 60 d) photo-insensitive and heat tolerant variety with semi-erect growth habit. It has green plants without purple pigmentation. Its flowers have white standard petals and purple wing petals. It has medium size seeds (about 14 g 100 seeds-1) with brown color and rough seed coat texture. It has combined resistance to major diseases and insects. This has been used as a parent in crosses for identifying DNA markers for S. gesnerioides resistance (Boukar et al., 2004).

IT97K-205-8 is derived from an F6 selection from the cross IT93K-596-12/IT93K-2046-1. IT93K-596-12 involves IT90K-59 and IT88D-715 as parents and IT93K-2046-1 involves IT90K-48-1 and IT88D-719 as parents. IT90K-59 and IT90K-48-1 are F5 sister lines from the backcross IT84S-2246-4/B301/IT84S-2246-4. IT88D-715 and IT86D-719 are sister lines from the double cross TVx 6332/TvU 3236/(Kamboinse local/TvU 946-2E. Kamboinse local is a landrace from Burkina Faso and TvU 946-2E is derived from the cross IFI 503/IFI 44-3 both from Nigeria. IT97K-205-8 is an extra-early (about 60 d) heat tolerant and photo-insensitive variety with erect growth habit. It has purple pigmentation on nodes of stem and leaves as well as on the calyx and pod tips, but the flower is white with a purple line on the back of the standard petal. It has medium size white seeds (about 15 g 100 seeds-1) with a rough seed coat. In addition to being resistant to Striga and Alectra, it has combined resistance to major diseases and insects. On the basis of its extra-early maturity and high yield potential, it performs well in the Sahelian region of Niger Republic and as a niche crop in the wheat–rice system of northern India.

IT97K-499-35 is a sister line of IT97K-205-8 and therefore it has the same pedigree, but it is a medium maturing variety (about 75 d) with semi-erect growth habit. Its pigmentation and flower color are also similar to IT97K-205-8, but it has larger white seeds (about 18 g 100 seeds-1). In addition to being resistant to Striga and Alectra, it has combined resistance to major diseases and insect pests. It has been extensively tested in Nigeria and on the basis of its consistent high yield, it has been recommended for release in the northern Guinea Savanna of Nigeria where Septoria, Striga and Alectra are a major problem.

IT87K-819-118 is an F6 plant derived line from the backcross IT90K-59//IT88D-867-11/IT88D-867-11. IT88D-867-11 is...