

NRC 142: Specialty soybean free from Kunitz trypsin inhibitor and off-flavour generating lipoxigenase 2

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Soybean was introduced in India with the expectation that the crop being one of the most economical sources of protein (approximately 40%) would combat rampant protein malnutrition among masses. However, soybean did not gain popularity as a protein source despite the declining per capita availability of pulses, the staple source of protein in Indian diet. Presence of anti-nutritional factor, namely, kunitz trypsin inhibitor and off-flavour generating lipoxigenases in soybean grains constrain their utilization in food uses. Kunitz trypsin inhibitor present in soybean seeds affects the digestibility of proteins and if left active in the soy products may cause pancreatic hypertrophy. Lipoxigenase is the off-flavour generating enzyme which exists in 3 isozymic forms, namely, lipoxigenase 1, lipoxigenase 2 and lipoxigenase 3 in soybean seed. These isozymes act upon polyunsaturated fatty acids, when the seeds are crushed to process soy food products, thereby releasing aldehyde and ketone compounds. Of these 3 isozymes, lipoxigenase 2 is the principal contributor to the off-flavour. Though both kunitz trypsin inhibitor and lipoxigenase 2 are heat labile but the heat treatment incurs extra cost and affects the solubility of proteins. Genetic elimination of these two formidable undesirable components from soybean seeds is the dire need of soy food industry. ICAR-IISR has already developed and commercialized Kunitz trypsin inhibitor free soybean genotypes, namely, NRC101 and NRC 102. The institute has also developed NRC 127, which is free from Kunitz trypsin inhibitor and identified for release to farmers of Central zone. The institute has also developed and commercialized lipoxigenase 2 free soybean, namely, NRC109 to soya food industries. However, soya food industries are demanding soybean genotypes free from Kunitz trypsin inhibitor as well as lipoxigenase 2. To cater to this need of soy food industries, NRC 142 was developed from a triple cross JS 97-52 x PI 596540 x PI 542044, through marker assisted forward breeding. PI542044 and PI 596540 were the donors for null alleles of Kunitz trypsin inhibitor and lipoxigenase 2, respectively. The plant of this genotype produces purple flowers in 40 days, attains height of 75 cm, and reaches harvest maturity in 98 days (Figure 1). The seeds are of light-yellow colour with black hilum, and weight of 100 mature seeds (10 % moisture) is about 14.0 g (Figure 2). The yield potential of this genotype is 3.2 tonnes per ha. The genotype would serve as excellent raw material for soy food industry, and more importantly, being high yielding with additional quality traits can fetch better prices to farmers.



Figure 1



Figure 2