Melhoramento de Espécies Forrageiras

Near Infra-Red Spectroscopy as a Tool for Breeding High Quality Forage

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Plant breeding is an explicitly cost-effective approach for increasing nutritional quality of forage crops. The main priority in breeding forages is to develop high biomass yield, high persistence, and disease/pest resistant cultivars. Selection for improved feed quality has been progressively implemented in different forage breeding programs worldwide. Significant increases in animal performance have arisen from relatively small increases in feed quality. Focuses have been on decreasing neutral detergent fiber (NDF) and increasing crude protein, digestibility, and neutral detergent soluble fiber (pectin). Although digestibility is not a trait of plants, since it is not regulated by plant genes, it is correlated with many other plant traits, such as decreased lignin or increased protein / soluble carbohydrates. Selection of superior genotypes for quality traits is extremely expensive via wet lab reference methods. Thus, forage breeders depend greatly upon near-infrared reflectance spectroscopy (NIRS) for developing prediction equations and evaluating forage quality. NIRS comes up with faster and more reliable forage quality evaluations. As an example, Embrapa forage breeding program includes, since 2016, the first effort for breeding improved quality forage of *Andropogon gayanus* Kunth. Breeding objectives embrace increasing digestibility and pectin content, as well as decreasing NDF content. To do so, half-sib families from three populations will be characterized and genetic variability will be estimated for biomass yield and quality traits. Oven dried (55°C) whole-plant samples of all parents and half-sib progenies will be grounded through a 1mm Willey mill. Spectra will be collected for all of them in a FOSS NIRS 5000. Ten percent of the samples will be evaluated via wet lab reference methods. Multiple least square regression equations will be developed based on both analysis, spectral and reference methods, to estimate quality traits, such as protein, NDF, ADF, lignin, *in vitro* digestibility and pectin of all samples. Superior parent genotypes will then be selected and crossed to develop synthetic populations with higher productivity and higher forage quality attributes.

Key words: Near infra-red reflectance spectroscopy; breeding for quality; forage quality.