Correlation of Economically Important Traits in Warm-Season Forage Legume Species

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Abstract: To determine the correlation coefficients for different economically important traits using three warm-season forage legume species of cowpea (Vigna unguiculata (L.) Walp.), lablab bean (Lablab purpureus L.) and rice bean (Vigna umbellata Thunb.), the observations were recorded on plant height, number of branches/plant, number of pods/peduncle, number of pods/plant, number of seeds/pod, pod length, days to 50% flowering, 100-seed weight, days to maturity, grain yield, straw yield and biomass. Simple correlation was used to see the association among plant traits. The species were significantly (p<0.05) different for most of the parameters studied showing variability among the genotypes for those characters. A significant (p<0.05) positive correlation was observed for plant height with pod length and 100-seed weight, number of branches/plant with days to 50% flowering and days to maturity, number of pods/peduncle with number of pods/plant, pod length with seed size, number of seeds/pod with pod length, days to 50% flowering with days to maturity, grain yield with straw yield and TDM (total dry matter) and straw yield with TDM. It indicates that these positive associations may be exploited for any improvement work of the traits in warm-season forage legumes to improve their overall productivity and production.

Key words: Forage legume, cowpea, Vigna unguiculata, lablab bean, Lablab purpureus, rice bean, Vigna umbellata, correlation

Introduction
In Pakistan, green fodder is one of the limiting factors to maintain the livestock productivity. The shortage reaches up to 75% during fodder lean periods (Iqbal et al., 1998). The improvement in productivity and production and better management of fodder can overcome this problem. Forage legumes are an excellent source of high quality feed due to their high protein contents as compared to the grasses. Furthermore, their cultivation in mixture with grasses, stimulates the growth of associated grasses by providing nitrogen fixed by legumes in the presence of Rhizobium leguminosarum. In this way, they also help in soil rehabilitation (Lancaster et al., 1949). Legumes also contain several times as much calcium as grasses which is one of the most important minerals in milk. The productivity and production of forage legumes have many constraints. The major constraint for increased forage production is the non-availability of high forage yielding varieties for different agro-ecological zones. The varieties must carry the genes for wider adaptability and should be versatile in nature. Heat and drought tolerant forage legumes in summer are desirable. Furthermore, to increase fodder yield, there is a need to improve economically important traits in the genotypes. An important step in this direction is the establishment of an association between certain characters which may help the plant breeders in improving and selecting the genotypes from breeding populations for the desirable traits. Therefore, the objective of the present study was to determine the correlation coefficients for different economically important traits in three warm-season forage legume species of cowpea (Vigna unguiculata (L.) Walp.), lablab bean (Lablab purpureus L.) and rice bean (Vigna umbellata Thunb.).

Materials and Methods
The experiment was planted on 4th July, 1998 at National Agriculture Research Centre (NARC), Islamabad. Ecologically, the area lies in sub-tropical, sub-humid Pothower tract. Average rainfall in this area is around 1000 mm which is mostly received during monsoon season. The soil of experimental area was alluvial, moderately calcareous with slightly alkaline pH and low in organic matter.

The three warm-season forage legume species of rice bean, lablab bean and cowpea cv. P-76 (control) were used for study. The experiment was planted in Randomized Complete Block Design (RCBD) with 3 replications. The plot size was 4 x 8 m with 10 rows/plot and 50 cm apart under rainfed conditions without any fertilizer. The seed rate of 100 kg ha⁻¹ was used for all the species. The plots of cowpea were harvested on 4th October, 1998, lablab bean on 3rd November, 1998 and rice bean on 10th November, 1998. The plant observations were recorded from five randomly selected plants in each plot and replication. The characters observed were plant height, number of branches/plant, number of pods/peduncle, number of pods/plant, number of seeds/pod, pod length, 100-seed weight, days to 50% flowering, days to maturity, grain yield, straw yield and total dry matter (TDM). The data were analyzed using computer software programme MSTATC.

Results and Discussion
Grain yield and straw yield were highly significantly
correlated with TDM. The plant height had significant positive correlation with pod length and 100-seed weight but it was non-significant with number of pods/peduncle, grain yield, straw yield and TDM, but significantly negative correlation with number of branches/plant, days to 50% flowering and days to maturity (Table 1).

The number of branches/plant had significantly positive correlation with days to 50% flowering and maturity, and significantly negative correlation with pod length and seed size. The number of pods/peduncle had positive significant correlation with number of pods/plant and non-significant with days to 50% flowering and days to maturity. It showed negative non-significant correlation with rest of the characters except number of seeds/pod and pod length. The number of seeds/pod had positive non-significant correlation with all characters except pod length, days to 50% flowering and maturity. It showed negative non-significant correlation with pod length and 100-seed weight, number of seeds/pod and pod length, days to 50% flowering and days to maturity, number of pods/peduncle, number of pods/plant, pod length with seed size, number of seeds/pod and 100-seed weight (seed size). Days to flowering has direct effect on days to maturity and crop yield. Ponmariammal and Das (1996) studied correlation for fodder yield in cowpea. Their study showed that higher forage yield was associated with late flowering, height and more leaves. Therefore, increase or decrease in days to flowering will ultimately affect the days to maturity of a crop.

A significant positive correlation was found for plant height with pod length and 100-seed weight, number of branches/plant with days to 50% flowering and days to maturity, number of pods/peduncle with number of pods/plant, pod length with seed size, number of seeds/pod with pod length, days to 50% flowering and days to maturity, grain yield with straw yield and TDM, and straw yield with TDM. These positive associations may be exploited for any improvement work of the traits in warm-season forage legumes to improve their overall productivity and production.

References


