CHAPTER II

REVIEW OF LITERATURE

2.1 Relationship between the seed sizes and their production location

2.2 The processing recoveries and seed sizes

2.3 The relationship among bulk density, seed size and processing recoveries

2.1 RELATIONSHIP BETWEEN THE SEED SIZES AND THEIR PRODUCTION LOCATION

Dharmalingam and Ramakrishnan (1978) found that larger seeds of blackgram retained by six and seven wire mesh sieves were better in terms of standard germination test, field emergence test and seedling vigour test than small seeds.

Amaral and Dos (1979) studied the effect of weight and size of seed on physiological quality and yield of rice grain. He found that the rice seeds of large size to have better physiological quality than small seeds and gave high percentage of emergence in the field.

Lokesh et al., (2003) concluded that 1000 seed weight, vigour index, germination percent increased with increase in seed size in all the varieties, while the percent seed recovery was decreased. Since, the seed size had influence on seed quality, the seeds retained on larger screen size were found superior in respect to seed quality, but the percent seed recovery was less. Therefore, the medium seed size was found better with respect to all observed seed quality and percent recovery.

Anuradha et al., (2009) examined the influence of seed size on physiological and biochemical seed quality characters evaluated in Bengal gram cv. CO 4 using seeds retained on 19/64”, 18/64”, and 16/64”, round perforated metal sieves and with seeds passed through 16/64”, round perforated metal sieves along with control. The estimations revealed that larger size seeds retained on 19/64” round perforated metal sieves recorded the maximum germination and seedling vigour. The protein content, dehydrogenase and α-amylase activity were also more in larger sized seeds followed by medium sized seeds,
indicating that the seed size had a positive association with seed quality parameters in chick pea.

Hossain et al., (2010) revealed that the high quality seed has the potential to attract premium prices. Hence, the breeding of desirable quality traits, including seed size for desi and kabuli-types, is of major importance. Fitting of seed size group ratios to inheritance models indicated that seed size is governed by two major complementary genes, where small size is dominant. The low genotype x environment interaction (<6.0 per cent of the total variation for either population) suggests limited environmental influence on this trait. Subsequently, two major quantitative trait loci (QTL) were identified, one on LG 4 (QTL1) and one on LG 1 (QTL2), that together accounted for 20 per cent of the seed size trait and may be targeted for future fine mapping and associated selectable marker development. These same loci also accounted for 37 per cent of the phenotypic variance for 100-seed weight across the two environments, indicating the close genetic relationship between seed size and weight.

Ambika et al.,(2014) studied the effect of seed size on seedling vigour and seed yield and reported that seed size is an important physical indicator that affects vegetative growth, frequently relating to yield, market grade factors and harvest efficiency. A wide array of different effects of seed size has been reported for seed germination, emergence and related agronomic aspects in many crop species. Generally, large seed size has better field performance than small seed.

Olayinka et al., (2016) conducted a field experiment to evaluate the effect of seed size on seedling emergence, biological yield and proximate composition of groundnut (Arachis hypogaea L.). Matured seeds were graded into three different seed sizes with respect to length. The large seeds were 1.3 to 1.5 cm, medium seeds 1.1 to 1.25 cm and small seeds were equal to or less than 0.83 cm in length. The results of this study revealed that large seed size is associated with improved growth and seed yield.

2.2 THE PROCESSING RECOVERIES AND SEED SIZES

Basvegowda (1988) studied the performance evaluation of threshing and air screen seed cleaner for sunflower seeds and revealed that the germinability increased
with increase in screen in sunflower and maize, while the recovery percentage decreased with increase in screen size.

Krishnaveni and Vanangamudi (1989) examined the seed size in maize and recommended 18/64” round sieve as optimum sieve for CCH-1 maize hybrid to obtain high recovery of seeds with good germination and vigour. Greater seedling vigour of the large seed was attributed to more availability and mobilization of reserve food material.

Hanumantharaya (1991) examined the performance of air screen seed cleaner for paddy, redgram and sunflower seeds. He found that maximum seed recovery was obtained with 1.75 mm (oblong) sieves without affecting the quality of seed in Jaya and IR 20 varieties of paddy as compared to the present practice of using 1.85 mm sieve size.

Maiya et al., (2001) studied the effect of size grading on recovery and quality in naturally colored. The results revealed that vigour potential was good in large and medium size seeds than small seeds and concluded that high 100 seed weight and high seed recovery is up to 4.75 mm sieve and recommended to use screen size of 4.75 mm for optimum field performance of naturally colored cotton.

Lokesh et al., (2003) studied per cent seed recovery with respect to seed size in finger millet and concluded that the percent seed recovery was less on the seeds retained on the larger screen size, that is small seeded showing higher recovery compared to large seeds. The study concluded that, 1000 seed weight, germination percent and vigour index increases with increase in seed size in all the varieties, while the percent recovery decreases. Since, the seed size had influence on seed quality, the seeds retained on larger screen size were found superior in respect to seed quality, but the percent seed recovery was less. Therefore, the medium seed size was found better with respect to all observed seed quality and percent recovery.

Anuradha et al., (2009) studied the influence of seed size on seed quality of chickpea. The study concluded that larger size seeds retained on 19/64" round perforated metal sieve recorded the maximum germination and seedling vigour but the percent recovery is low. The higher recovery of seeds and higher germination and vigour parameters are obtained when seeds can be size graded using 18/64" sieve for getting good quality seeds.
2.3 THE RELATIONSHIP AMONG BULK DENSITY, SEED SIZE AND PROCESSING RECOVERIES

Gubbels (1974) studied the growth of corn seedlings under low temperature as affected by genotype, seed size, total oil and fatty acid content of the seed and found a significant correlation between seed size as indicated by 100 seed weight of maize and vigour variables.

Hoy et al., (1985) studied the effects of seed size and density on germination of soybean seeds. The study revealed that the largest seeds and the low density seeds performed worst in the standard germination test, although there was an indication that the viability of extremely small seeds may also be low. Single seed leachate conductivity levels were the highest for large seeds and low density seeds, indicating low vigor. Bulk conductivity tests showed high levels of leakage in large seeds, but did not detect differences between seeds of high and low density. Seed size and seed density effects were usually less pronounced or non-existent in seed lots of extremely high or extremely low vigor. Furthermore, the effects of seed size and density on viability and vigor do not appear to be of sufficient magnitude to allow for significant seed lot improvement through conditioning unless cleanout percentages are prohibitively high.

Krishnaveni and Ramaswamy (1986) reported that large seed in COH-1 hybrid maize produced vigorous seedlings while smaller seeds produced weak seedlings. They further recommended that grading of seed lots should be based not only on seed size but also on seed weight as it showed close association with seedling vigour.

Krishnaveni and Vanangamudi (1989) reported that seed size in maize has got significant influence on the 100 seed weight, germination and vigour index before and after accelerated ageing in corn.

Kausal et al. (1993) observed that about 10 to 11% good quality seed can be saved by replacing the present grading sieve by 8/64” and 7/64” size sieve in sorghum and green gram respectively. Germination, physical purity and 100 seed weight were found to improve significantly with the increase in sieve size, while processing recovery in all crop varieties decreased.
Karababa (2006) studied the physical properties of popcorn kernels and concluded that the sphericity, kernel volume, kernel surface area, and thousand seed weight increased linearly from 0.677 to 0.717, 73.24 to 125.14 mm³, 96.26 to 134.92 mm², and 136 to 157 g, respectively. The true density and bulk density decreased linearly from 1.304 to 1.224 g/cm³ and 0.771 to 0.703 g/cm³ respectively while porosity increased from 40.87% to 42.56%. True and bulk density slightly decreased linearly with increase of moisture content but porosity increased with increase in moisture content. The bulk density of the kernel was observed to decrease linearly from 0.771 to 0.703 as the moisture content increased from 8.95% to 17.12%. Also observed bulk density of neem nut, lentil seeds, sunflower seeds and white lupin, respectively, to decrease linearly with increase in grain moisture content.

Vishwanath et al., (2006) assessed the screen sizes for grading french bean varieties viz., Arka koaml and Burpee stringless. About 17 - 18 per cent more good seeds could be saved in Arka koaml by replacing the present recommended size 4.75 mm by 4.50 mm. Seed quality parameters viz., 100 seed weight, germination, seedling length, vigour index were found to improve significantly with increase in sieve in both the varieties.

Maruthi (2011) studied the significant differences in seed density of sweet corn with the variations in the screen size. Seeds retained on 5.25 mm (S) screen showed the highest bulk density of 0.7926 g/cc followed by 5.00 mm(S) (0.7856 g/cc), 4.50 mm(S) (0.7646 g/cc), unprocessed (0.7463 g/cc) and the lowest was in 3.50 mm(S) (0.7153 g/cc) in cv. Madhuri. Similar trend was observed in case of cv. Priya. Seeds retained on 5.25 mm (S) screen showed highest bulk density of 0.8146 g/cc followed by 5.00 mm(S) (0.8045 g/cc), 4.50 mm(S) (0.7833 g/cc), unprocessed (0.7753 g/cc) and lowest was in 3.50 mm(S) (0.7553 g/cc). As the screen size increased from 3.50 mm(S) to 5.25 mm(S), the seed density significantly increased in both the cultivars, Madhuri and Priya.