microflora. The descriptive use of chemicals and their residual toxicity adversely affects the non-targeted animals including human being besides affecting the seed quality. Many of the synthetic chemicals look effective but they are not readily degradable physically or biologically which yield more toxic residues. Hence, safe and feasible approach is the treatment of seeds with botanicals which are safe, economical, ecofriendly, cheap, easily available locally and non harmful to seed, animals and human beings.

MATERIAL AND METHODS

The laboratory experiment was carried out to study the effect of containers and seed treatments on storability of sunflower at Seed Research Laboratory of National Seed Project, University of Agricultural Sciences, Dharwad and the average monthly maximum temperature of 35.8^{0}C was recorded in March and minimum of 13.7^{0}C in February month whereas, the highest relative humidity of 87 per cent during August and the lowest relative humidity of 43 per cent during March was recorded.

The storage experiment comprised of three containers (C_1: Vacuum packing, C_2: Polythene bag and C_3: Cloth bag) and six seed treatments [T_1:Sweet flag rhizome powder (5 g/kg),T_2: Neem leaf powder (10 g/kg), T_3: Custard apple seed Powder (10 g/kg), T_4: Deltamethrine @ 40 mg/kg, T_5: Vitavax (3 g/kg) and T_6: Control (without any seed treatments).] in three replications. The seeds were treated and packed in different containers as per treatments mentioned above stored for 11 months under ambient conditions. Seed quality evaluations were made initially and subsequently at monthly interval for 11 months, the untreated seed samples were used as control. The seed quality parameters like germination percentage, seedling viguor index, electrical conductivity (dS m^{-1}) and moisture content (%) were recorded and analysed by using Completely Randomized Design (CRD) in factorial concept and replicated three times. The CD values were calculated and treatments were compared as per (Steel and Torrie, 1984) procedure of analysis.

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following heads :

Containers :

The germination percentage, seedling viguor index, electric conductivity and moisture content differed significantly due to the storage containers. However, significantly higher germination percentage (91.12 to 84.45%) and seedling viguor index (3373 to 2935) were recorded in C_3: (vacuum packing) which was at par with C_2: (polythene bag) and lowest in C_1: (cloth bag) (92.04 to 63.20% and 3187 to 2005, respectively) from initial to the end of 11 months of storage period (Table 1 and 3). The probable reason for retaining such high germination percentage might be due to the depletion of O_2 and increase in the concentration of CO_2 thereby inactivating the harmful organisms, either insects or moulds before they become numerous enough to cause serious damage to seeds as observed by Bailey (1965). Kopeikovskii and Turbitsyn (1968) also reported that four basic factors like temperature, seed moisture content, rate of air entry and concentration of CO_2 involved were intimately related with the maintenance of viability and germination of sunflower. Similar results were reported by Bhattacharyya *et al.* (1983) and Ankaiah *et al.* (2006) in sunflower.

The electrical conductivity was significantly lower in the seeds stored in vacuum packing which recorded 225dSm^{-1} at the end of storage period as compared to the cloth bag (297dSm^{-1}). Similarly, the moisture content was the lowest in C_3 (8.57%) followed by C_2 (9.23 %) and the highest in C_1 (10.55%) at the end of eleventh month of storage (Table 2 and 4). The results are in accordance with the reports of Shivayogi (2003) in cotton and Divya Shree (2006) in oilseed crops.

All the seed quality parameters declined at a faster rate in the seed stored in cloth bags compared to the seeds stored in vacuum packing and polythene bags due to increase in moisture content of the seed. Increase in the moisture content led to a greater metabolic activity and increased the respiration rate which in turn led to more utilization of food reserves. Similar results were also reported by Sharma *et al.* (1998) in soybean, Doijode (1988) in French bean, Dadlani and Vasisht (2006) in soybean and Lakshmi *et al.* (2006) in sunflower.

Treatments :

The germination percentage, seedling viguor index, electric conductivity and moisture content differed significantly due to the seed treatment with botanical, fungicides and insecticides. However, significantly higher germination percentage (92.54 to 84.37%) and seedling viguor index (3381 to 2865) were recorded in vitavax followed by neem leaf powder from first month to eleventh month of storage period. The lowest germination and seedling viguor index was recorded in control (91.79 to 60.36% and 3320 to 2037, respectively). The decline in germination percentage may be attributed to ageing effect leading to depletion of food reserves and decline in synthetic activity of leading to death of seed due to fungal invasion, insect damage, fluctuating temperature, relative humidity and storage container in which the seeds are stored.

The electrical conductivity was significantly lower in the seeds treated with vitavax powder which recorded 232 dSm^{-1} at the end of storage period as compared to the custard apple powder treated seeds (275 dSm^{-1}). Similarly, seed moisture content was less throughout the storage in seeds treated with vitavax (8.08% to 9.14%) followed by neem leaf powder compared to the control (8.27 to 9.84%) from initial to