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Short communication

Dehydration methods and their impact on microbial contamination in Kachari *(Cucumis callosus)* products

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Kachari (*Cucumis callosus*) is an important cucurbitaceous vegetable grown in arid region of Western Rajasthan. The quality attributes with reference to microbial contamination, their role on nutrients depletion and myco toxicity are important concern in any post harvest products prepared from fruits and vegetables. Different products are prepared from vegetables and stored for long and short term but storage of post harvest products after convenient treatment is important to maintain the nutritional status and hygienic level under various conditions. Out of different horticultural crops of arid region, very limited works on post harvest process and storage conditions have been carried in crops like pomegranate. Low temperature (2°C) was suitable for fruits with flavour similar to that at harvest but main losses occurred by *Penicillium* spp. at 5°C and the quality and shelf-life of pomegranate could be improved by curing at 2°C and intermittent warming during cold storage (Artes *et al.*, 1996; 2000). However, post harvest pathogens can spoil those products stored under unhygienic conditions having favourable climatic conditions for growth and sporulation. Kanwar *et al.* (1974) reported the effect of temperature and relative humidity on the development of soft rot of pomegranate fruits due to *Rhizopus arrhizus* Fischer. *Kachari* as important arid vegetables stored in different form to meet out the demand during off season. The powder prepared from the dry fruits is used in *garam masala* industries. However, no attempts have been made so far to study the effect of different drying methods and their impact on microbial contamination and hence, the present study was undertaken and the enumeration of microbial population in different dehydration methods on *kachari* products are discussed.

This study was carried out using the dehydrated *kachari* products stored for different periods of time in the post harvest technology laboratory of CIAH, Bikaner during the year 2005. The total microbial population including bacteria and different species of fungi associated with these products were enumerated through artificial inoculation of samples in specific culture medium. Yeast extract agar (Yeast extract- 10.00 g, glucose-10.00g and agar 15g) was used for the growth of different fungal species and Nutrient glucose agar medium (Protease peptone 20g, beef extract 5g and agar 15g) was used for the isolation of bacterial population. The media were adjusted with pH 7.0 and as per the medium compositions. Sterilized media were poured (20 ml/plate) in Petri plates.

A set of samples from each treatments (oven dried for 30 months without peel, Sun dried (16 months old), Shade dried (16 months old), Sun dried (3 months old), Shade dried (3 months old), Oven dried (03months old), Sun dried (16 months old), Shade dried (16 months old), Oven dried (16 months), Powder with peel –30 months (Refrigerator), Powder with out peel-30 months (Refrigerator), Powder with peel 16 months at ambient conditions) were randomly drawn and pooled together. After through mixing of these samples, few bits were taken from each treatment and used for the isolation of microbial populations.

Samples were cut into small pieces with a sterile scalpel and placed over the Petri plates containing sterile solid medium. Petri plates were incubated at constant temperature ranging from 25 ± 2°C maintained in B.O.D. incubator. Growth of the fungi and bacteria were monitored at 24hrs intervals and the number of colonies from each plate was recorded. The genera of the fungal population were identified based on the cultural and morphological characters. Observations under simple microscope on mycelia, conidiophores and conidia of the test of fungal genera were further confirmed with the standard descriptions (Barnett,1960; Webster, 1980 and Sarbhoy, 2000). All experiments were repeated twice and each treatment was replicated for 3 times (5 plates in each replication) in completely randomized block design. Data on per cent colonization were subjected to suitable transformation for analysis of variance (ANOVA) and assumed at $p<0.01$ and 0.05% level of significance.

The overall results presented in Table 1 revealed that the *kachari* products were associated with different genera of saprophytic fungal and bacterial populations. However,

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the intensity or the level of contamination varied among the dehydration methods. Out of twelve different treatments, *kachari* without peels subjected to tray drying did not have any microbial colonization even after two and half year of storage under ambient conditions. Perhaps due to the treatment effect in addition to the nature of the samples which did not contain the surface tissues (peeled) which may normally act as carrier of the contaminants at storage stage. Conversely, the same product stored under refrigerator conditions was infected (20%) by *Rhizopus* sp. Maximum colonization of *Rhizopus* sp ranging from 30-100% was noticed in *kachari* slices dried under shade and direct sun light. Powder form of *kachari* fruits contained more bacterial population. Shade dried (16 months old) product showed 60% *Rhizopus* sp, 10% *Penicillium* sp and 10% bacteria. The post harvest products colonized by the toxigenic fungi like *Penicillium* spp as evidenced from the present investigation is important concern in terms of health point of view. However, most of the other toxigenic fungi did not contaminate rest of the samples. This is the first kind of investigation revealing the importance of dehydration methods on quality of *kachari* products.

Although no works have been carried out so far in this crop, few reports on mycoflora of other arid vegetables like *Khejri* are available. Bohra and Purohit (2000) have studied the mycoflora of stored seeds of *Prosopis cineraria* (*Khejri*) collected from different localities of Rajasthan using the blotter paper technique. *A. flavus* was dominant in almost all samples tested. *A. niger, A. fumigatus* and *A. ochraceus* were also present in abundance, while species of *Fusarium, Curvularia, Chaetomium, Alternaria, Stachybotrys* and *Rhizopus* were recorded in some of the samples. The results showed in *P.cineraria*, 23 out of 54 isolates of *A. flavus* produced aflatoxins.

In present study, *kachari* fruits under shade dry contained the toxin producing fungal genera like *Aspergillus* and *Penicillium* spp. Of the toxigenic isolates, 21 produced B_1 aflatoxin, whereas 2 produced both B_1 and B_2 aflatoxins. The amount of aflatoxin produced by the isolates from seeds was up to 1690 µg/kg and in pods was up to 1956 µg /kg. Among the 21 seed samples screened, only 9 were contaminated naturally with aflatoxins and the concentration of aflatoxin B_1 was up to 285 µg /kg in seeds and up to 1610 microgram/kg in pods (Bohra, and Purohit, 2003). A study conducted by Bohra and Purohit (2000) on the biodeterioration of seeds of *P. cineraria* by *A. flavus* showed a reduction in reducing sugar, total soluble sugar and protein content, and an increase in phenol concentration and such kind of basic works are further required in case of *kachari* also. It is summarized that the dehydration methods have great influence on quality parameters particularly on microbial population. Further works are required on refinement such tray or oven drying method in large scale with scope on industrial use to maintain the quality and nutritive value of *kachari* products.

Table 1. Microbial population in dehydrated products of Kachari

Products from dehydrated methods	Microbial population in different media	
	NA	YEA
Oven dried 30 months without peel	Nil	Nil
Sun dried (16 months old)	30% Bacillus sp Rhizopus sp 20%	Rhizopus sp 90%
Shade dried (16 months old)	30% Bacillus sp 60% Rhizopus sp	100% Rhizopus sp 25% Aspegillus spp.
Sun dried (03 months old)	30% Bacillus sp 45% Rhizopus	35% Rhizopus sp
Shade dried (03 months old)	25% Rhizopus sp 10% Bacillus sp	25% Rhizopus sp 15% Aspegillus spp.
Oven dried (03months old)	10% Bacillus sp 10-Rhizopus sp	15% Rhizopus sp
Sun dried (16 months old)	95% Rhizopus sp	100% Rhizopus sp
Shade dried (16 months old)	60% Rhizopus sp 10% Bacteria	10% Penicillium sp 25% Rhizopus sp
Oven dried (16 months)	20% Rhizopus sp	20% Rhizopus sp
Powder with peel –30 months (Refrigerator)	50% Bacteria 20% Rhizopus sp	40% Rhizopus
Powder with out peel-30 months (Refrigerator)	55% Bacteria 20% Rhizopus sp	25% Rhizopus sp
Powder with peel 16 months, ambient conditions	100 % Bacteria	14.5% Rhizopus

Values are means of 3 replications each after 28hrs of incubation
NA = Nutrient Agar, YEA = Yeast Extract Agar

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