Research Article
CODEN (USA): IJPLCP
[Duraisankar & Ravindran, 4(7): July, 2013]
ISSN: 0976-7126

INTERNATIONAL JOURNAL OF PHARMACY & LIFE SCIENCES

Microbial quality of herbal medicine in production unit

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Abstract

Microorganisms are one of the primary causes of spoilage and off-flavors in food products. Consequently, the production of consistent, high-quality food products requires the implementation of a through, well-planned cleaning and sanitizing program aimed at controlling and/or reducing the amount of bacteria entering products during and after processing / preparation. The microbial sampling and enumeration of food contact surfaces and food products. To evaluate and record the microbial condition of food products and food contact surfaces. In order to know that food is being processed safely, the best indicator is the Aerobic Plate Count (APC) of the food. In this study, Microbial air and surface swab microbial contamination from Herbal medicine production unit was examined. The main objective was given to the surfaces in the area of herbal medicine production, the air present in the each and every cabinet of processing unit.

Key-Words: Microbial Air, Surface quality of production unit

Introduction

The monitoring of microbial contamination of surfaces and/or of the air is of fundamental importance in all situation in which not optimal sanitary conditions can lead to the spread of infectious diseases or to the contamination of food, drug or medical products. These controls and the necessary cleaning procedures are usually performed at refectories and worker's canteens[1] food and drug industries, analysis and quality control laboratories, research laboratories, lecture and reading halls, etc[2].

Airborne microorganisms may cause various negative effects, especially infectious, allergenic and immunotoxic diseases. Fungal conidia present in the air contain extremely high amounts of mycotoxins. According to[3] inhalation of mycotoxins may be more dangerous than their consumption with contaminated food [4]. The concentration and kind of microorganisms in the indoor air depends on technical factors (i.e. type and age of a building), number of inhabitants (people or animals), the type of heating and ventilation systems, and microclimatic conditions: temperature, humidity, concentration of gases, lighting or dust concentration[5]. Improper working methods and hygienic conditions may be causes of considerable microbial air pollution[6].

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To estimate the health risk of microbiological air contamination it's necessary to evaluate the number of bacteria and fungi, including potentially pathogenic strains[7]. For this paper the number of mesophilic, hemolytic and coli-group bacteria, Mannitol+ staphylococci and moulds in farming environment were determined.

Sampling the environment for biological materials more important in establishing the indoor quality of particular production plant.[8] Biological materials are more difficult of evaluate.[9] These include fungal spores and bacteria from the outdoors occur in all structure itself, the ventilation system (heating/ cooling /humidification) and the presence of filtering system[1] In addition to the normal influx of outdoor organisms into a building, additional organisms can grow within the building. This occurs when there is right combination of factors, including proper temperature, humidity and materials on which the organisms grow.[11]

Material and Methods

Collection of samples

The air, surface swab samples required for the study was collected from Herbal medicine production unit. The total area of the herbal medicine production unit is 2.65acres. The unit comprises of 4 main sections from where the samples were collected and about 150 labours are employed in these four sections. Air samples and Surface swab samples were collected randomly from the raw drugs section, slabs of processing unit, surface of the vessel section and the

slabs of the packing section. About 50cm^2 areas was swabbed.

Enumeration of microbes in surface

For enumeration of microbes from the surface direct swab method was employed. Nutrient agar, plate count agar, Rose Bengal agar was prepared and sterilized (Tilak, 1972). The surfaces of the various section for which the microbe has to be enumerated was swabbed using sterile swabs in an area of 50 cm^2. Then these swabs were spread over the media plated. The nutrient and plate count agar were incubated at 37^{0}c for 18 – 24 hrs and those of the martin's Rose Bengal agar and plate count agar with Chloramphenicol were incubated at room temperature for 2 -3 days. The swab samples were collected during morning hours, mid – day hours and at the end of the day

Enumeration of micro organisms present in air

Air – borne microorganisms may be allowed to settle by gravitational force on the surface of the agar medium for a definite period of time and then incubated and studied. The plates were exposed to air for varying periods. For this purpose the lid was removed and microbes carrying particles were allowed to settle on the agar surface for half an hour and finally lid was placed over plate. The plates were incubated for at 37^{0}c for 24- 48 hrs and results were recorded.[12]

Results and Discussion

Food, microorganisms and humans have a long and interesting association that developed long before the beginning of recorded history.[13] Food is not only of nutritional value of those who consume them but often are ideal culture media for microbial growth. The foods that we eat are rarely if ever sterile, they carry microbial association whose composition depends upon which organisms gain access and how they grow, survive and interact in the food over time.[14] Microorganism might get their entrance in various food stuffs through various means like air borne bacteria, surface borne microorganisms.[15] So it is crucial to chick the quality of food before consuming. It becomes an important contribution to examine various food stuffs available in public places like market.[16,17] the purpose of this study was conducted with aim to enumerate microbial load of the air, and surface at Herbal medicine production unit. Enumeration of both bacteria and fungi of air and surface samples and compared with the standard (table – 1).

The levels of airborne bacteria and fungi at raw drugs, processing and packaging section had been listed. The number of airborne bacteria was listed in ascending order in processing area (Table-2)shows low 12 microbial load where as stores house show highest 285 bacterial load (Figure-1) in case of fungi the same processing area 7 fungal load(Table -3) where as raw drug show highest 112 fungal count (Figure-2). Similarly, the bacterial and fungal colonies were enumerated from surface swab method. The number of bacterial count present in the sample were listed in ascending order parpam and chendhuram section (9 x CFU/50cm$^{2)}$ shows (Table-4) low number of bacterial count where as Tablet machine section (62 x CFU/50cm$^{2)}$ highest bacterial count(Figure-3). In case of fungi powdering section and parpam section show low number of fungi colonies (Table-5)where as in ball mill section the fungal count was high(Figure-4). A comparison of results of the present study with the reference to standards clearly shows that the quality of air and surface swab methods has to be improving from the present status. This can be linked with the fact that the processing unit in equation can build up a good network of production, making it possible to obtain hygienic herbal formulation if certain parameters are controlled.

Herbal formulation had attracted a wide attention throughout the world because of its effectiveness and no side effects. So the maintenance of its quality plays a major role of its product marketability as today it has to compete with other medicines. In order to produce herbal medicines without any complaints, one has to take care from the very first step of production. Quality control of the raw materials, the water being used, the machines and the premises where the whole process takes place is an important aspect in improving the use of traditional medicines. Standardization methods, quality control data on safety and efficacy are needed for proper understanding of the use herbal medicines.

Conclusion

The contamination can be prevented by proper cleaning handling and processing. The employees shall be given proper instruction on Aseptic methods of handling. Proper ventilation through HEPA filters and cleaning at regular intervals would also improve the quality of the environment. The water for the preparation of medicines shall be priory subjected to treatment to reduce the microbial counts.

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Table 1: WHO standard of hygienic control

S/No.	No. of spoilage microorganisms	Rating
1.	<1 CFU/50 sq.cof <1 cfu/ml of rinse solution	Excellent
2.	2-10 CFU/50 sq.cm	Good
3.	11->100CFU/50 sq.cm	Clean uptime
4.	101->1000CFU/50 sq.cm	Out of control, shut down and find the problem

Table 2: Enumeration of Air micro flora (Bacteria) from different areas of herbal processing unit

S/No.	Air sample taken from	Bacteria	percentage	Degree
1.	Raw drugs section- 1 (Store house)	285	37.54	135.144
2.	Raw drugs section-2 (Cleaning section)	86	11.33	40.788
3.	Lehyam preparation – 1	95	12.51	45.036
4.	Lehyam preparation – 2	12	1.58	5.688
5.	Parpam & Chendhuram preparation	110	14.49	52.164
6.	Grinding section	57	7.50	27.0
7.	Juice extraction section	40	5.27	18.972
8.	Powdering section	18	2.37	8.532
9.	Quarantine section	12	1.58	5.688
10	Packing section	30	3.95	14.22
11.	Packaging (stores house)	14	1.84	6.624

Table 3: Enumeration of Air micro flora (Fungi) from different areas of herbal processing unit

S/No.	Air sample taken from	Fungi	percentage	Degree
1.	Raw drugs section (Store house)	112	32.46	116.85
2.	Raw drugs section (Cleaning section)	54	15.65	56.34
3.	Lehyam preparation – 1	42	12.17	43.812
4.	Lehyam preparation – 2	9	2.60	9.36
5.	Parpam & Chendhuram preparation	23	6.66	23.976
6.	Grinding section	65	18.84	67.824
7.	Juice extraction section	15	4.34	15.624
8.	Powdering section	7	2.02	7.272
9.	Quarantine section	4	1.15	4.14
10.	Packing section	12	3.47	12.492
11.	Packaging (stores house)	6	1.73	6.228

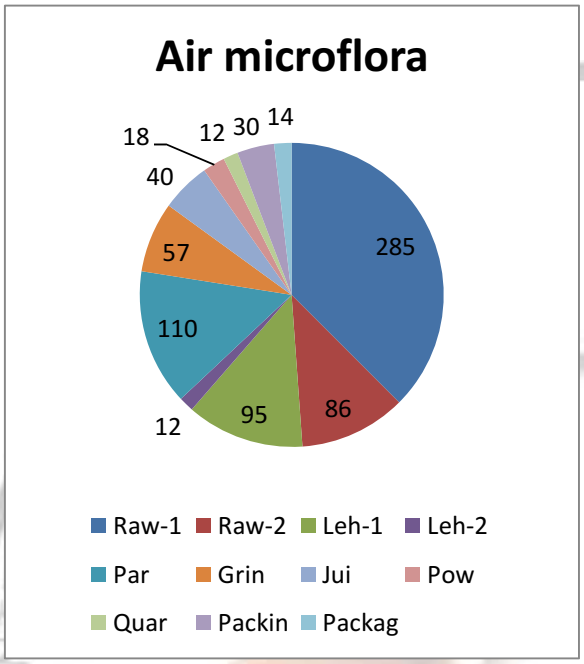
Table 4: Enumeration of Bacteria from the surface of the processing area by direct swabbing methods

S/No.	Sample collected	Bacteria CFU/50cm^2	Percentage	Degree
1.	Lehyam preparation section	25	8.23	29.628
2.	Tablet machine	62	20.39	73.404
3.	Juice extraction section	28	9.21	33.156
4.	Grinder section	15	4.93	17.748
5.	Powdering section	30	9.86	35.496
6.	Plundering Machine	35	11.56	41.616
7.	Quarantine section	14	4.60	16.56
8.	Ball mill section	10	3.28	11.808
9.	Parpam Chendhuram preparation	9	2.96	10.656
10.	Packaging section (Slab-1)	48	15.78	56.808
11.	Packaging section (Slab-2)	28	9.21	33.156

Table 5: Enumeration of Fungi from the surface of the processing area by direct swabbing methods

S/No.	Sample collected	Fungi(CFU/50cm^2)	Percentage	Degree
1.	Lehyam preparation section	12	6.55	23.58
2.	Tablet machine	18	9.83	35.388
3.	Juice extraction section	16	8.74	31.464
4.	Grinder section	22	12.02	43.272
5.	Powdering section	11	6.01	21.636
6.	Plundering Machine	14	7.65	27.54
7.	Quarantine section	15	8.19	29.484
8.	Ball mill section	25	13.66	49.176
9.	Parpam Chendhuram preparation	7	3.82	13.752
10.	Packaging section (Slab-1)	23	12.77	45.972
11.	Packaging section (Slab-2)	20	10.92	39.312

ISSN: 0976-7126



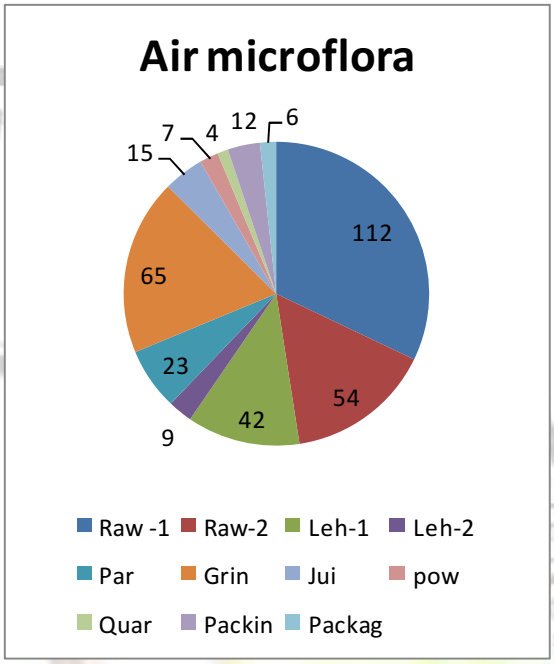
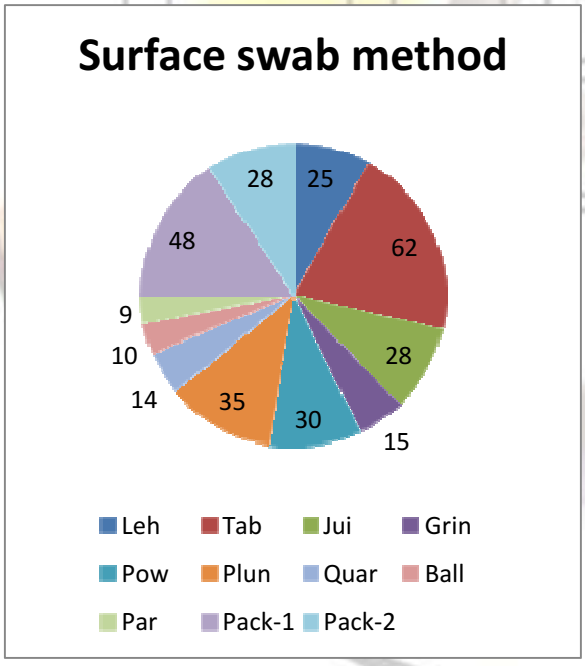


Fig. 1: Enumeration of Air micro flora (Bacteria) from Different areas of herbal processing unit

Fig. 2: Enumeration of Air micro flora (Fungi) from Different areas of herbal processing unit



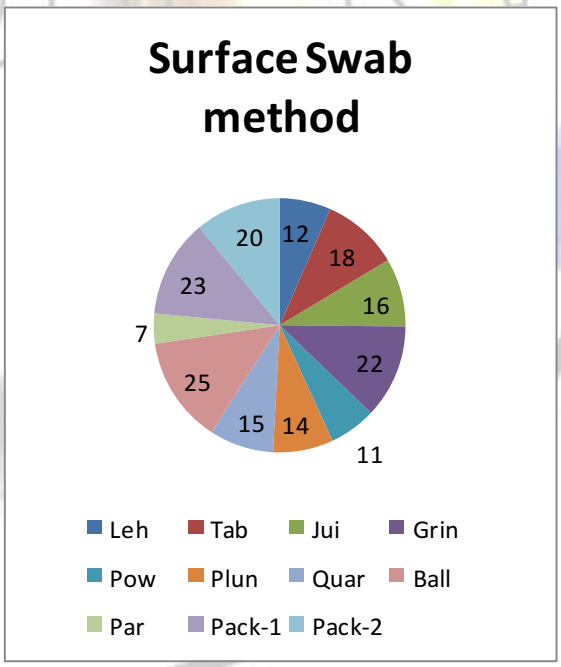


Fig. 3: Enumeration of Bacteria from the surface of the processing area direct Swabbing method

Fig. 4: Enumerations of Fungi from the surface of the processing area by direct Swabbing method