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Research Article

Ultrasonic extraction of onion (*Allium cepa*) peel dye, its applications on silk fabric with bio-mordants and its antibacterial activity

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ABSTRACT

Ecofriendly natural dye was extracted ultrasonically from the red onion peel (*Allium cepa*). It is applied on silk fabric with and without bio-mordants. Bio-mordants used were tea leaves, tamarind, aloe vera and acacia bark ash. Colorfastness, color measurement and antibacterial properties were studied. Among colourfastness properties colourfastness to washing, light, heat, rubbing, seawater and dry-cleaning were studied. Dyed fabrics were also subjected to colour measurement values i.e Tristimulus properties (XYZ), Labs values and Munsell renotations (Hue,Vivideness and Chroma). Antibacterial properties against three strains of bacteria i.e escherichia coli, staphylococeus aureus and pseudomonas aeruginosa were also performed.

Keywords: *Allium cepa*; Biomordants; Ultrasonic, Colourmeasurements; Antibacterial; Munsell notation.

INTRODUCTION

Protection of environment from hazardous, risky, toxic and poisonous materials has turned into a subject of significant concern in all over the world [1,2]. Environmental and ecological directions are turning out to be stricter everywhere throughout the world and are compelling the movement of innovation towards less contaminating or especially non-polluting technological improvements and developments [3].

Water contamination and air pollution due to the use of synthetic dyes and especially the control of industrial effluents has become a major issue [4,5]. Research has demonstrated that synthetic dyes are suspected by discharging unsafe chemicals that are allergenic, cancer-causing and detrimental to human being [6,7] As most of the synthetic azo dyes are produced by the reductive cleavage of synthetic azo dyes and are producing amines that are carcinogenic and allergenic. Germany has become the principal nation to boycott and ban certain azo dyes, in the light of the fact that their cleavage produce amines which are considered to be carcinogenic [8-10]. At present, many countries especially European and American have stopped using fabrics dyed with these banned manufactured synthetic dyes [11,12]. Investigators sponsored by ETAD (Ecological and Toxicological Association of Dye Stuff Manufacturing Industry) also recognized and assessed the danger to human being brought about by colourants based on benzidine [13,14].

In the above scenario, the promotion and utilization of 'Green' natural dyes and pigments deserve encouragement [15-17]. Dyes are intensely coloured material which when applied to a fabric imparts colour to that fabric while pigments are additionally hued substances that are partially soluble in water and mostly dissolvable in organic solvents [18]. Synthetic dyes are obtained from organic and inorganic compounds [19]. It includes mordant dyes, acidic dyes, basic dyes, reactive dyes,direct dyes and so forth [20]. On the other hand, natural dyes include colourants that are derived from different parts of the plants (barks, roots, stems and berries), animals, minerals and vegetables without any chemical

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processing and synthetic handling [21,22]. Utilization of natural colours goes back to antiquated time. Ancient people used natural dyes as colouring of fabrics, painting caves and colouring of pottery and ceramics. Human race is fascinated by colours from the beginning [8,23].

Nature has bestowed us more than 450 types of plants from which colouring material can be extracted [24]. From the natural plants all the shades of the rainbow can be obtained. These are non-sensitive to skin, non-toxic, non-cancer-causing. These dyes also tend to harmonize with the environment and have better compatibility with the nature [8,25,26].

The onion (*Allium cepa*) is also named as the bulb onion. Onion (*Allium cepa*) is placed in the Lilliaceae family and is grown all over the world. Yellow onion outer shells produce a golden range of earthy colours. A concentrated dye bath is made and for a sufficient time fiber is soaked. In this way the colours obtained are a mixture of red and yellow, generally in orange colour range. Onion outer peels are the usually unwanted commercial and household food wastes which are used as dyes to colour natural textile and leather materials. Onion dye is known as pelargonidin (3, 5, 7, 4'-tetrahydroxy anthocyanidin), and work like acid dyes which can dye the natural protein fibers at high efficacy. The quantity of pelargonidin is almost 2.25% in solvent extraction procedures when soxhlet apparatus is used. Pelargonidin has four hydroxy (Auxochrome groups) which shows good dyeing properties to dye natural protein fibers.

This work is focused on extraction of natural red *Allium cepa* peel dye by Ultrasonic method and dyeing with Meta-mordanting technique. Ultrasonic extraction and dyeing method are the greener environment friendly techniques which save a lot of energy by saving time and temperature. Similarly use of bio-mordants instead of synthetic mordants is also environment friendly way of applying the dye on fabric [27].

MATERIALS AND METHODS

Textiles

Silk and Multifiber (DW).

Chemicals and Solvents

Grade 3 water, Detergent ECE (without optical brightener), Sodium per borate, l-histidine monochloride monodhydrate, Sodium dihyrogen orthophosphate, Sodium carbonate, Sodium hydroxide. All chemicals used were of AR Grade.

Glassware

Beakers (Pyrex), Stainless Steel Glasses, Thermometers, Measuring Cylinders, Measuring Flasks, Quick Fit flat bottom flasks, Quick Fit Round Bottom Conical flasks. Conical Flasks, China Dishes, Funnels, Filter Papers, Magnets.

Instruments

- 300 Ultrasonic Bath, Electrical balance,Water bath,Launder-o-meter,Perspirometer,
- Crockmeter,OvenCi3000+Hotplates,Colourmeasuring system ZE 80,UV Visible Spectrophotometer,Infrared Spectrophotometer,D400 IR Dyeing Machine,Weather-o-meter.

Sources of Raw Materials

Outer waste peel of red Onion (*Allium cepa*) was collected from vegetable Mandi in Lahore. All the waste colouring dye stuff was thoroughly washed so that all impurities were removed and then dried in open air.

Ultrasonic Dye Extraction Method

100 gram red onion skin waste peel dystuff were chopped and grinded into small fine pieces. They were then soaked into 500 ml Grade-3 water for about one hour in 600 ml Pyrix Beakers seperately so that material becomes soft. Beakers with soaked dyestuff, were then placed in Ultrasonic Sonicator and they were sonicated at (27-30 MHz and 160V) for 30 minutes at 50 to 60oC temperature. After sonication, the contents of beaker were filtered through standard sieves of different mesh sizes. The red coloured solutions were obtained. pH of solutions were mintained at 4-5 with lemon juice. These solutions were dried and used for further tests without further purification [28-30].

Ultrasonic Dyeing Method

Substrate: Pure silk fabric was obtained from silk industry in Lahore for dyeing.

Scouring of Silk Fabric: The scouring of silk fabric was done by washing in a solution containing 0.5 g/L sodium bicarbonate and 2 g/L detergent at 50oC for 25 minutes, keeping the material to liqoure ratio at 1:50. Scoured fabric was thoroughly washed with tap water and dried at room temperature. The scoured fabric was soaked in distilled water for 30 minutes prior to dyeing or mordanting.

Dyeing Procedure: Silk fabrics were dyed with and without mordants for 2% concentration shades. The scoured fabrics of weight 10 gms were soaked in water for 30 minutes before dyeing.

Stock solutions were made prior to dyeing by the formula=WXP/C

Where, W=weight of fabric, P=%age shade and C=Concentration of dye in stock solution.

Liquor ratio of fabric to solvent was=1:50

i.e., for 1 gm fabric 50 ml solvent (dye extract plus water) was required

Dyeing without Mordant

Dyeing without mordant samples were labeled as control samples. In this method, dye solutions with scoured and soaked silk fabrics were added in the glasses or beakers, placed them on ultrasonic bath and then heated at 45°C. 2% and 4% concentration shade were made by dyeing the fabrics at 60 degree C. pH was maintained at 4-5 with the help of Lemon juice. After dyeing, fabrics were removed from the glasses. Fabrics were first washed with cold water then with hot water and then again with

cold water. Fabrics were squeezed and dried in open air or at a temperature not more than 60 C in the Oven.

Dyeing with Mordants

Four Bio-mordants were used for dyeing by Metamordanting method. In Metamordanting method mordants were used in between the dyeing

Biomordants used for dyeing were:

• Tea leaves, Temarind, Aloe vera, Acacia bark ash

Colour fastness Test Methods

Colourfastness test methods were performed according to ISO-105 (17025) British Standard test methods.

Colour fastness to Washing Method

Colourfastness to washing of all the dyed silk fabrics was determined according to ISO-105 C-06 method. Washing was done by preparing the soap solution containing 4 g detergent and 1 g sodium perborate per litre of distilled water. Then pH was adjusted to 10.5 + 0.1 by the addition of 1 g of sodium carbonate. 10 x 4 cm of silk fabric pieces were attached to each multifiber DW by sewing alongwith one of the shorter sides. The specimens were put into glasses of Launder-o-meter for 30 minutes at 60°C having liquor ratio 50:1. After 30 minutes samples were removed, washed and dried at temperature not more than 60°C. The change in shade and stain were assessed with the help of grey scale.

Colourfastness to Perspiration Method

Tests were carried out by dipping the fabrics into l-histidine monohydrochloride monohydrate solution according to ISO 105 E-04 method. 4 x 10 cm of silk fabric pieces were attached to each multifiber by sewing alongwith one of the shorter sides and dipped separately into alkaline and acidic solutions for 30 min having liquor ratio 50: 1. Then the silk specimens were placed in the perspirometer kits and the desired pressure was applied. These kits were placed in the vaccum oven for 4 hours. Then the kits were removed from the oven, dried at 60°C by hanging in air.

Perspirometer kit consists of a frame of stainless steel into which a weight piece of mass 5 kg and a base of 60 mm x 115 mm is closely fitted, so that a pressure of 12.5 kPa can be applied on test specimens. The test device should be constructed so that if the weight piece is removed during test, then pressure of 12.5 kPa remains unchanged.

Colour fastness to Light Method

Light fastness was carried out according to ISO-105 standard procedure B-02 on Weatherometer by Atlas. Fabrics of measurement 7 cm x 12 cm of silk were exposed to Xenon Arc lamp for 24 hours, at standard testing conditions using blue wool as standard reference fabric. These silk fabrics were compared with grey scale for evaluation of change in shade.

Colour fastness to Dry and Wet Rubbing Method

Rubbing fastness (dry and wet) test was carried out according to ISO-105 standard test procedure. Dry rubbing on silk fabrics was carried out with the help of Crock meter instrument under a pressure of 9 N, in to and fro movements on standard rubbing cloth. Both wrap and weft readings were noted. Wet rubbing is performed with the same procedure as for dry rubbing. Only the standard cloth is wet out with water.

Colourfastness to Dry Cleaning Method

Colourfastness to dry cleaning was done with the help of solvent Perchloroethylene according to method ISO-105 DO-1. Undyed cotton twill bags of 10 cm x 10 cm measurements were stitched around three sides. Silk fabrics of 4 cm x 10 cm measurements were placed in separate bags along with 12 non-corrodable stainless steel disks and the fourth side of the bag was sewed. Then the bags were placed in the separate containers of Washtec containing 200 ml of perchloroethylene solvent and agitated for 30 minutes at 30°C. Afterwards the bags were removed from the container. The samples were squeezed to remove surplus solvent and dried in the air by hanging them at a temperature of 60°C. Assessment of change in colour of samples was carried out with the help of grey scale.

Colour fastness Seawater Method

Colour fastness to sea water was evaluated in the same manner as for the colour fastness to perspiration. ISO-105 EO-2 method was used for colour fastness to sea water. For colour fastness to seawater, fabrics alongwith multifibers were dipped in NaCl solution (30 gm/L) for 30 mins. For sea water colourfastness the above treated composite fabrics were put in Perspirometer Kit. The kit was placed in the oven for 4 hours at 37+2°C. Then the specimens were dried at temperature not more than 60°C. Change in shade and stain were noted with the help of grey scale

Colour fastness to Dry Heat Method

Dry hot pressing was performed by pressing the silk fabrics at a temperature of 110+2°C with iron and change in shades were assessed with grey scale (ISO-I05-A02).

Colour Measurement Properties

Colour measurement properties were taken on colour measuring instrument. Tristimulus values XYZ, Lab values and Munsell renotations (Hue, Chroma and Value/Vividness) were noted. Value denotes lightness/vivideness, Chroma shows saturation of colour on fabric and Hue is the brightness and depth of colour (RGYB).

Antibacterial Test Methods

Antibacterial activities of the extracted dyes were estimated by minimum inhibitory concentration (MIC, ug ML-1). Standard culture media of bacteria Escherichia coli (ATCC 13706), Staphylococcus aureus and Pseudomonas aeruginosa (MTCC 4240) were obtained. Bacteria were inoculated into 5 ml of liquid SCD medium (soyabean, casein and digest) and cultured for 24 h at 35.5°C. The cultured fluids were diluted, adjusted to a

concentration of 105-106 microorganisms per ml and used for inculation in the MIC test. The test materials were suspended in water, and solutions were then diluted with SCD medium for bacteria. Using them, the two-fold diluted solutions with concentrations of 50 mg ml-1 to 1.675 mg ml-1 were prepared. Each 1 ml of culture medium containing various concentrations of test materials was inoculated with 0.1 ml of the microorganism suspension prepared above. Bacteria were cultured for one day at 35.5°C. Growth of the microorganisms was monitored during this period. When no growth of microorganism was observed in the medium containing the lowest concentration of test materials, the MIC of the test material was defined at this point of solution.

RESULTS AND DISCUSSION

Results of colourfastness properties of waste (*Allium cepa*) outer peel dye

Silk fabrics were dyed with *Allium cepa* outer peel dye by ultrasonic greener technique with 2% dyeing concentration solutions by using four Biomordants (Tea leaves, Temarind, Aloevera and Acacia bark ash) [31]. The results of wash fastness properties of *Allium cepa* dye on silk fabrics are given in Table 1.

Table 1: Wash Fastness Properties of 2% Shade of Silk Fabrics.

Mordants	Diacetate	Cotton	Nylon	Polyester	Polyacrylic	Wool	Change in shade
Control (without mordants)	5	4-5	5	5	5	4-5	4-5
Tea leaves	5	4-5	5	5	5	4-5	4
Temarind	5	4-5	5	5	5	4-5	5
Aloevera	4-5	4	4-5	4-5	4-5	4-5	4
Acacia bark ash	5	5	5	5	5	4-5	5

Silk fabrics of 2% concentration shades when dyed with (*Allium cepa*) skin dye without mordants (Diacetate, Nylon, Polyester and Polyacrylic) strips of DW multifiber showed Excellent (5) grey scale (ISO 105-A03) ratings for staining. For (Cotton and Wool) strips of multifibe DW grey scale ratings of change in stain were very Good ie (4-5) because less dye bleeds to adjacent Multifiber strips. For change in shade of silk fabric dyed without mordant, grey scale (ISO 105-A02) rating was very Good (4-5). For change in stain results with Tealeaves, Temarind and Acacia bark ash mordants are evident from the Tables 2 and 3 above. These are mostly Excellent (5) and very Good (4-5). Only Aloevera mordant showed Good (4) rating. It means very less dye is bleeded and very less is imparted to adjacent fabrics of multifiber DW strip. For result of change in shade with mordants Acacia bark ash was Excelent (5). Aloevera and Tea leaves mordants showed Good (4) rating for colourfastness to washing because less stable bonds were formed between the mordants, dye and fiber.

Table 2: Acidic Perspiration of 2% Shade of Silk Fabrics.

Mordants	Diacetate	Cotton	Nylon	Polyester	Polyacrylic	Wool	Change in shade
Control (without mordants)	4-5	4-5	4-5	4-5	4-5	4	3
Tea leaves	5	4-5	5	5	5	4-5	4
Temarind	5	4-5	5	5	4-5	5	4-5
Aloevera	4	4	4-5	5	5	4	2-3
Acacia bark ash	5	4-5	5	5	4-5	4-5	4

Table 3: Basic Perspiration of 2% Shade of Silk Fabrics.

Mordants	Diacetate	Cotton	Nylon	Polyester	Polyacrylic	Wool	Change in shade
Control (without mordants)	4-5	4-5	4-5	4-5	4-5	4	3
Tea leaves	4-5	4-5	4-5	5	4-5	4	3
Temarind	4-5	5	5	5	5	4	3-4
Aloevera	4	3-4	4-5	5	4-5	4-5	3
Acacia bark ash	4-5	4	5	5	5	4-5	4-5

For (control) without mordant, silk fabrics of 2% concentration shades when dyed with *Allium cepa* waste peel dye (Diacetate, Nylon, Polyester and Polyacrylic) strips of DW multifiber showed (5) Excellent, grey scale (ISO 105-A03) rating. For (Cotton and Wool) strips of multifiber the ratings of change in stain were (4-5) very Good and (4) Good. For change in shade of silk fabrics dyed without mordants grey scale (ISO 105-A02) rating was (3-4) Satisfactory. For change in stain of results with Tealeaves, Temarind, Aloevera and Acacia bark ash, mordants can be viewed from the Table 4. These are mostly (5) Excellent and (4-5) very Good with few exceptions of (4) ie Good results. It means that dye bleeds but very less goes to adjacent fabrics of multifiber DW strip. For results of change in shade Temarind and Acacia bark ash mordants showed (4-5) very Good results. Tea leaves biomordant showed (4) Good results and Aloevera showed (3-4) Satisfactory results because Aloevera did not make any stable bonding with fiber and dye as well.

Table 4: Rubbing Fastness Properties of 2% Shade of Silk Fabrics.

Mordants	Dry Rubbing		Wet Rubbing	
	Warp	Weft	Warp	Weft
Control (Without mordant)	4-5	4-5	4-5	4-5
Tea leaves	5	5	4	4
Temarind	5	5	4	4-5
Aloevera	4-5	4-5	4	4
Acacia bark ash	5	5	4-5	4-5

For control without mordant silk fabrics of 2% shade showed (5) excellent ratings on multifiber DW (Diacetate, Nylon, Polyester and Polyacrylic) strips and very Good (4-5) ratings for (Cotton and Wool) strips. For colour fastness to change in shade on grey scale result was (3-4) satisfactory. Results for change in stain on multifiber strip DW can be seen in the Table with Tealeaves, Temarind, Aloevera and Acacia bark ash. These are mostly (5) Excellent, (4-5) very Good and (4) Good. Results of change in shade with the mordants Tea leaves, Temarind, are (4) good while with Aloevera results were Satisfactory [32] Table 5.

Table 5: Light Fastness Properties of 2% Shade of Silk Fabric.

Conc. Of Dye	Mordants	Change in shade
2%	Control (Without mordant)	5
	Tea leaves	5-6
	Temarind	5-6
	Aloevera	5-6
	Acacia bark ash	6-7

Change in shade for dry and wet rubbing along warp and weft sides of silk fabrics when dyed without mordants for 2% shade showed (4-5) best rating of grey scale for change in shade and with mordants above for dry rubbing along warp and weft sides grey scale rating was (5) excellent to (4-5) best while for wet rubbing fastness ratings were (4-5) best to (4) Good [33].

Light fastness rating of dyed silk fabrics with and without mordants was taken against Blue Wool standard fabric on Weather-O-meter. Light fastness of 2% dye concentration silk fabric change in shade dyed without mordants was (5) as seen from Table above. So light fastness increased with the increase of concentration shade. Reason is this that increases in the submicroscopic particles of the dye on fabric exposing smaller area of dyes to light and air. Change in shade for light fastness on silk fabric dyed with mordants Tealeaves,Temarind and Aloevera was (5-6) while with Acacia bark ash was (6-7). Similarly when grey scale rating results were compared with resuls of mordants those were better than without mordants with Metamordanting dyeing method by ultrasonic technique. Again Biomodants showed better results because biomordants has astringent properties and fix the dye to greater extent. Mostly biomordants contain tannins and poly phenols which makes strong bond with the fabric as well as with the dye and work in a better way for dye fixation. Metamordanting technique is good because in this technique mordants are added during dyeing hence dye fixation is better [34] Table 6.

Table 6: Colour Fastness to Dry Cleaning of 2% dyed silk fabrics with and without mordants.

Conc. Of Dye	Mordants	Change in shade	Change in shade of solvent
2%	Control (Without mordant)	5	5
	Tea leaves	4-5	4-5
	Temarind	5	5
	Aloevera	4-5	4-5
	Acacia Bark Ash	4-5	5

Results for colour fastness to Dry cleaning on silk Fabrics dyed with and without mordants for 2% shades were (5) Excellent and (4-5) very Good for change in shade of fabrics as well as for change in shade of solvent. It means dye is partially soluble in perchloethylene solvent when some of the mordants were used as viewed from the above Table 4.29 above. Hence dry cleaning results were from Excellent to very good Table 7.

Table 7: Colour Fastness to Seawater for 2% Shade of Silk Fabrics.

Mordants	Diacetate	Cotton	Nylon	Polyester	Polyacrylic	Wool	Change in shade
Control (without mordants	4-5	4-5	5	4-5	4-5	4	4-5
Tea leaves	5	4	4-5	5	5	4-5	4-5
Temarind	4-5	4-5	5	5	4-5	4	4-5
Aloevera	4-5	4-5	4-5	4	5	4	4-5
Acacia Bark ash	4-5	4-5	4-5	5	5	5	4-5

Colour fastness to sea water showed Good to Excellent results for dyed silk fabrics with 2% shade giving ratings (4), (4-5) and (5) ie Good, very Good and Excellent ratings for change in shade and change in stain on grey scales (ISO-105-A02 and ISO-105 A03). Results showed that 30 gm/L salt didn't affect so much on silk fabrics dyed with and without mordants Table 8.

Table 8: Heat Fastness Properties of 2% shade of dyed silk fabrics.

Conc. Of Dye	Mordants	Temperature	Change in shade
2%	Control (Without mordant)	110 0C	4
	Tea leaves	-	4-5
	Temarind	-	4-5
	Aloevera	-	4
	Acacia bark ash	-	5

For 2% concentrations change in shade of heat fastness of silk fabrics dyed without mordants was Good (4) and (4-5) very Good respectively. Change in shade for 2% shade with Tealeaves,Temarind mordants was (4-5) very Good rating on grey scale for assessing change in shade of dyed silk fabrics. Aloevera mordant showed (4) Good rating while result with Acacia bark ash mordant was (5) Excellent on grey scale.

Colour measurement values of *Allium cepa* outer waste skin Dye

Results of colour measurements of silk samples dyes with and without mordants are given in the following tables. Tristimulus values (XYZ), LAB values (LAB) and Munsell renotation values (Hue, Value/Vividness and Chroma) were noted Table 9.

Table 9: Resuts of Colour Measurements of silk Fabrics dyed without Mordant for Onion skin dye.

Conc. of Dye	Time of Dyeing	Temp.	Tristimulus			LAB values			Munsell Renotations		
				Y	Z	L	a	b	Hue	Value	Chroma
2%	45 min	70°C	45.01	48.45	41.66	65.42	3.45	7.42	42.1	66.4	7.4

The colour coordinates XYZ, Lab values and Munsell renotations (Hue,Value and Chroma) were noted for 2% concentration dye solutions. Values of XYZ and Lab coordinates, Munsell values, Hue, Lightness and Chroma can be viewed from the Table 10.

Table 10: Results of Colour Measurements of silk Fabrics dyed with *Allium cepa* outer skin dye with Mordants.

Conc. of Dye	Mordants	Time (min)	Tristimulus			LAB values			Munsell Renotations		
			X	Y	Z	L	a	b	Hue	Value	Chroma
2%	Tea leaves	45	31.41	26.46	18.65	51.44	5.41	13.42	2.1 BGR	51.8	15.4
2%	Temarind	45	31.46	32.48	16.34	53.15	10.45	16.32	2.6 BGR	51.4	17.6
2%	Aloevera	45	36.45	34.43	32.14	46.01	16.45	22.15	46.45 BGR	63.1	10.2
2%	Acacia bark ash	45	24.45	23.35	15.48	55.45	11.45	14.74	5.9 BGR	53.5	16.1
2%	Aloevera	45	36.45	34.43	32.14	46.01	16.45	22.15	46.45 BGR	63.1	10.2
2%	Acacia bark ash	45	24.45	23.35	15.48	55.45	11.45	14.74	5.9 BGR	53.5	16.1

The Colour Cordinates XYZ, Lab and Munsell renotation values were noted for 2% dye concentration solutions on silk fabrics with assistance of different biomordants. Hue values are denoted by (BGR) which shows that Red *Allium cepa* outer waste skin showed BGR (Blue, Green and Red colour). (Waheed and Ashraf, 2003). Colours obtained with the assistance of mordants were more fast and permanent than fabrics dyed without mordants. With Aloevera mordants shades obtained were bright while with tealeaves, tamarind and acacia bark ash were dull. All the shades from reddish yellow to khaki brown were obtained with *Allium cepa* outer waste peel dye.

Results of Antibacterial activities of Red *Allium cepa* dye

Most of the natural plants and parts of plants like peels, shells, fruits and flowers show (antibacterial and antiviral) activities. Antibacterial studies of waste Red *Allium cepa* dye against three strains of bacteria (Escherichia coli, Staphylococcus aureus and Pseudomonas aeruginosa) were performed and following results were deducted.

Red *Allium cepa* dye extract showed +ive antibacterial properties mostly for solutions at high concentrations and -ive at low concentrations. Escherichia coli and Staphylococcus aureus showed the presence of antibacrerial activity from 50 mg/ml to 1.675 mg/ml dye concentration. Pseudomonas aeruginosa showed the presence of anti-bacterial activity from 50 mg/ml to 3.125 mg/ml dye concentration solution. Antibacterial study showed that Red *Allium cepa* dye extract has medicinal properties and can be used in Phamaceutical indyustry. It is abveious that peel of Red *Allium cepa* dye has some antimicrobial effect which saves its fruit from outer environment [35] Table 11.

Table 11: Antibacterial Studies Table.

Concentration in mg/ml	S aureus	E coli	P
50	+	+	+
25	+	+	+
12.5	+	+	+
6.25	+	+	+
3.125	+	+	+
1.675	+	+	-
0.84	-	-	-
0.42	-	-	-
0.21	-	-	-
+Sign indicates the presence of anti-bacterial activity -Sign indicates the absence of anti-bacterial activity			

CONCLUSION

Natural dyes have been emerged as a better substitute of synthetic dyes. Ultrasonic extraction of dyes and ultrasonic dyeing reduces the time, temperature and solvents which ultimately reduce the cost of processing. Similarly use of biomordants also lessens the hazardous and toxic effect of synthetic mordants. Colorfastness results of yellow, red and brown dyes produce with these biomordants were excellent. Antibacterial studies were carried out against E. coli, S. Aureus, P. Auregenosa and mild activity was observed.

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