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Seedlac Manufacturing through Integrated Lac Processing Unit: An Industrial Product

Seedlac manufactured from sticklac using developed integrated small scale lac processing unit with different treatments to know the variation in yield, color parameters and quality parameters. Mean seedlac yield obtained for seedlac manufactured using developed unit with different treatments of washing agent did not show any appreciable difference while mean impurity content was found within the standard limit. Color parameters of the manufactured seedlac with integrated unit were better compared to seedlac manufactured using small scale lac processing unit with same treatment. Addition of higher amount of washing agent within permissible limit, improves the lightness, redness and yellowness of seedlac manufactured using developed integrated unit compared to seedlac manufactured using small scale lac processing unit. All the quality parameters of manufactured seedlac using developed unit with different treatment of washing agent were determined and found within the acceptable limit as per standard values IS: 6921 – 1973. Grain size of seedlac manufactured from sticklac through the developed integrated unit was found similar to grain size of seedlac manufactured through small scale lac processing unit and were in accordance with the specification IS: 6921 – 1973. Maximum water soluble lac dye (a by-product of lac industry) was recovered from wash water of 1st batch washing with more than 50% dye content and lighter in color.

Key words: Integrated unit, Primary lac processing, Seedlac, Lac value addition.

The developed integrated lac processing unit is suitable for seedlac manufacturing from sticklac with similar yield, grain size, reduced impurity and better color compared to seedlac manufactured using small scale lac processing unit including acceptable quality parameters as per IS: 6921 – 1973.

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Introduction

The forest and sub-forest dwellers mainly depend on agriculture and forest produce for their livelihood and lac is an important source of their income. In India lac is mainly produced in Jharkhand, Chhattisgarh, Madhya Pradesh, West Bengal, Maharashtra, Odisha and part of Uttar Pradesh, Andhra Pradesh, Gujarat and NEH region. Lac is a natural resin secreted by the insect *Kerria lacca* (Kerr.) which thrives on the tender twigs of specific host trees *i.e. Butea monosperma* (palas), *Ziziphus mauritiana* (ber) and *Schleichera oleosa* (kusum). Lac is collected by cutting down the lac bearing twigs of hosts and lac encrustations are scraped from the twigs either by breaking off by hand or scraping with a knife or sickle. Scarped lac is known as sticklac which is sold in the market by cultivators either to manufacturers or to their representatives of processing industries where it is processed into seedlac for its further use in making lac based products (Prasad *et al.*, 2000). Lac resin being natural, biodegradable and non-toxic, finds application in food, textiles and pharmaceutical industries in addition to surface – coating, electrical and other fields and provides immense employment opportunities (Sharma *et al.*, 2006). Lac production in India was about 18,944 tons during year 2019-20. During the year 2019-20 India exported 7293.47 tons of lac in different forms valued 48661726.30 dollars (INR 405.52 Crores) (Yogi *et al*., 2021).

Primary lac processing operation involves five major unit operations like crushing, washing, drying, winnowing and grading. In lac processing industries, out of these operations, crushing, washing and grading are

done using large capacity crusher, washing machine and grader respectively. Unit operations like drying, cleaning and final grading are done manually.

Having done so at village level, lac grower can sell seedlac whenever they get remunerative price. Therefore, need was felt to develop facility for converting scraped lac or cut bits into seedlac at village level. Considering the need, machines required for establishing such facility at village level in form of small scale lac processing were designed and developed (Fig. 1) at ICAR – National Institute of Secondary Agriculture (NISA) (Formerly: ICAR – Indian Institute of Natural Resins and Gums), Ranchi (Prasad *et al*., 2008). Such processing unit can process 100 kg of sticklac in a day. Though small scale lac processing unit is working well, however need was felt to develop integrated small scale lac processing to reduce the man power requirement and cost of processing. Accordingly an integrated small scale lac processing unit was designed and developed (Sharma *et al*., 2020) by the scientists of ICAR – NISA, Ranchi in collaboration with scientists of ICAR – Central Institute of Agricultural Engineering, Bhopal and its performance evaluation was carried out at ICAR - Indian Institute of Natural Resins and Gums, Ranchi. The performance evaluation of the developed unit is presented in following sections.

Material and Methods

Integrated Small Scale Lac Processing Unit (Capacity – 100 kg/day) was designed and developed (Fig. 2) at ICAR – NISA, Ranchi and fabricated at ICAR – Central Institute of Agricultural Engineering, Bhopal to reduce manpower requirement, time and drudgery of the person involved in primary lac processing. The developed unit was used for seedlac manufacturing from sticklac and detailed methodology of the evaluation of the developed unit is as under.

In order to test the performance of developed integrated small scale lac processing unit, the following methodology was adopted to determine the various related parameters.

Yield, color and quality parameters determination of seedlac manufactured through integrated small scale lac processing unit

Performance of the developed Integrated Small Scale Lac Processing Unit was evaluated for seedlac manufacturing from sticklac. The seedlac yield, color parameters (lightness – L, redness – a and yellowness - b) and quality parameters (flow, life under heat, color index, hot alcohol insoluble – impurity, acid value, moisture content and wax content) of the seedlac manufactured using developed Integrated Small Scale Lac Processing Unit were determined for each treatments *i.e.* without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of crushed sticklac. Color parameters of seedlac manufactured through developed Integrated Small Scale Lac Processing Unit were also determined using Hunter's make calorimeter model LabScan XE at Processing and Demonstration Unit and quality parameters *i.e.* flow, life under heat, color index, hot alcohol insoluble – impurity, acid value, moisture content and wax content of the manufactured seedlac using developed Integrated Small Scale Lac Processing Unit were determined in Quality Evaluation Laboratory, as per standard IS: 6921 - 1973. During performance evaluation of the developed Integrated Small Scale Lac Processing Unit, seedlac yield, quality and color parameters of manufactured seedlac were determined separately for each treatment.

Seedlac yield

After seedlac manufacturing from sticklac using developed Integrated Small Scale Lac Processing Unit, seedlac yield by weight of sticklac obtained from different treatments *i.e.* without addition of washing agent (caustic soda) and with addition of washing agent

Fig. 1: Small scale lac processing unit

Fig. 2: Integrated small scale lac processing unit

(caustic soda) @ 0.100, 0.2125 and 0.425 % by weight of sticklac were separately determined for each treatment.

Color parameters

Color parameters *i.e.* lightness – L, redness – a and yellowness – b of seedlac manufactured using developed Integrated Small Scale Lac Processing Unit were determined for each treatment separately using Hunter's make calorimeter model Lab Scan XE to know the difference between color parameters of seedlac manufactured using the developed unit. The maximum value for L is 100, which would be a perfect reflecting diffuser. The minimum for L would be zero, which would be black. Positive a represents redness and negative a greenness value. Positive b represents yellowness and negative b blueness value (Fig. 3).

Quality parameters

During the performance evaluation trials of seedlac manufacturing using developed Integrated Small Scale Lac Processing Unit, samples of manufactured seedlac were drawn in substantial quantity for determination of quality parameters of seedlac manufactured with different treatments. Quality parameters *i.e.* flow, life, color index, hot alcohol insoluble (impurity), acid value, moisture content and wax content of the manufactured seedlac using developed integrated small scale lac processing unit were determined separately for each treatment as per standard IS: 6921 – 1973.

Primary lac processing using developed integrated small scale lac processing unit

In order to manufacture seedlac from sticklac using developed Integrated Small Scale Lac Processing Unit, sticklac (scraped lac) was fed manually on the sticklac feeding trough. Sticklac fed was transferred to sticklac feeding hopper continuously through gravity. As the

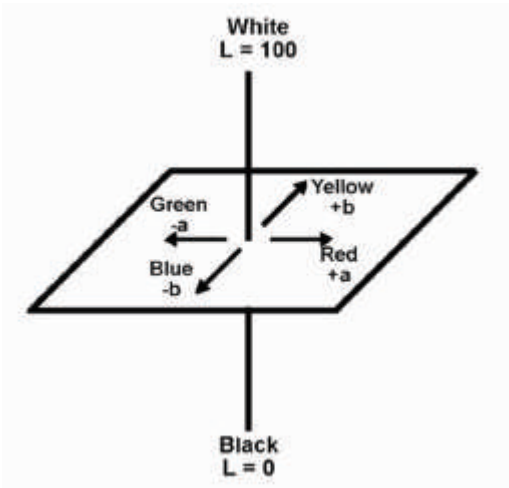

Fig. 3 : Diagram of Hunter's L, a and b color space

sticklac was fed in to the sticklac feeding hopper from sticklac feeding trough through gravity, sticklac was transferred from sticklac feeding hopper to sticklac receiving trough using bucket elevator provided in the developed unit. The sticklac received on the trough was guided towards crushing unit where size reduction of the sticklac was performed. After size reduction, crushed sticklac was graded in to two fractions namely 8-10 mesh (desired) size and oversize. The crushed sticklac graded in the fraction of 8-10 mesh size was automatically transferred in the crushed sticklac receiving hopper from the outlet of the grading unit. The transferred crushed sticklac in the crushed sticklac receiving hopper was again transferred to soaking unit through another bucket elevator system provided in the unit. The oversize sticklac grains obtained through grading unit was again sent to sticklac feeding hopper for

further size reduction operation through same line and the process of crushing was continued till end of oversize lac particles. After transfer of desired size crushed sticklac to soaking hopper, lac grains were soaked with water for required duration in soaking hopper provided in the unit. During soaking operation, churning was also carried out inside the hopper through agitator mechanism provided in the soaking hopper. After completion of soaking operation, soaked lac was transferred in to the washing barrel through opening the gate of butter fly valve manually, provided below the soaking hopper. After the soaked lac was transferred in to the washing barrel, lac grains in presence of water was churned for 15 min. After completion of 15 min churning, the wash water available in the washing barrel was drained out by tilting the washing barrel manually using tilting mechanism provided in the washing unit. After removal of wash water from washing barrel, again same amount of fresh water was added in the washing barrel and churning was done for 15 min. After completion of second churning operation, again wash water was drained out from the washing barrel. After removal of wash water, required amount of soda was added in the lac present inside the washing barrel and mixed properly by churning blades provided inside the washing barrel. The properly mixed lac particles with water were kept ideal for 15 min so that soda added in the lac removes impurity effectively. The lac present inside the washing barrel was now churned in the barrel without addition of water for 15 min. After completion of churning without water, required amount of fresh water was added in the washing barrel and churning was continued for 15 min. Again the wash water available in the washing barrel was drained out after 3rd batch washing operation and required amount of fresh water was added in the barrel for 4th batch washing operation and churning was carried out for 15 min. Same process of water addition and removal was carried out for 5th batch washing operation or till change of color of wash water became similar to normal water. After completion of lac washing operation, wash water present in the washing barrel was drained out by tilting the opening of washing barrel towards ground using tilting mechanism. After removal of wash water, washed seedlac was obtained on the washed seedlac receiving trough through outlet of washing barrel by completely opening the gate provided at the top of washing barrel. After washing, washed lac was dried in shed/under fan in thin layer (½" - 1") and time to time raking was done manually using wooden rake/hoe/by feet so that washed lac dried uniformly. After completion of drying operation, the dried lac was winnowed using lac winnower developed earlier at ICAR – NISA, Ranchi under Small Scale Lac Processing Unit to separate out the particles of sands, wood *etc.*

By- product recovery

Lac dye is used in textile industry as mordant dye for dying animal fibres like wool and silk (Pandey *et al.*, 2015). Colour of dye can be modified by the appropriate choice of mordant from violet to red and brown. In pure form, lac dye is also being used as food coloring material. It is reported that Japan, China and Thailand are using pure lac dye for coloring beverages and products like ham, sausages, bears, jams etc. thus it is suitable for further use as food additive after purification (Pandey *et al.*, 2015).

During seedlac manufacturing dye enriched washed water is discharged through the outlet of the washing barrel of developed integrated small scale lac processing unit and collected for recovery of lac dye as a by-product of lac industries. Wash water collected from the washing barrel of the developed unit in batches during seedlac manufacturing from sticklac was treated for recovery of lac dye separately as per standard IS: 12921-1990.

Results and Discussion

The detailed description of the performance evaluation of the developed Integrated Small Scale Lac Processing Unit for seedlac manufacturing from sticklac is as under.

Quality parameters of seedlac manufactured using integrated small scale lac processing unit

Seedlac yield, color parameters and quality parameters of seedlac manufactured using developed integrated small scale lac processing unit were separately determined for each treatment and results are detailed as below:

Seedlac yield

Mean yield of seedlac manufactured from sticklac using developed Integrated Small Scale Lac Processing Unit was determined separately for each treatment to compare the difference in mean yield of seedlac with different treatment *i.e.* without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of sticklac and presented in Table 1. The mean seedlac yield was 71.10%, 71.48%, 71.40% and 69.37%, respectively for without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.42% by weight of sticklac after second batch washing operation with mean impurity content 2.55%, 1.92%, 2.03% and 1.65%, respectively (Table 1). The finding reveals that mean seedlac yield obtained for seedlac manufactured without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of crushed sticklac through Integrated Small Scale Lac Processing Unit was closer to each other (Table 1). Mean impurity content in the seedlac manufactured through Integrated Small Scale Lac Processing Unit was found within the standard limit for all the treatments as detailed in Table 2.

Table 1 : Mean yield of seedlac using integrated small scale lac processing unit.

Amount of washing agent (caustic soda) (% by weight of sticklac)	Mean yield of seedlac by weight of sticklac, %
0.00	71.10 (±2.18)
0.10	71.48 (±1.37)
0.2125	71.40 (±1.51)
0.425	69.37 (±0.75)

Color parameters

Mean color parameters of seedlac manufactured using Integrated Small Scale Lac Processing Unit was determined separately for each treatments to compare the difference in color parameters *i.e.* lightness – L, redness – a and yellowness - b and presented in Table 3. Table 3 revealed that mean lightness, redness and yellowness values of seedlac was 25.51, 12.06 and 9.39 for seedlac manufactured through Integrated Small Scale Lac Processing Unit and 19.69, 8.44 and 5.94 for seedlac manufactured through Small Scale Lac Processing Unit, respectively without addition of washing agent (caustic soda). Mean lightness, redness and yellowness was 24.85, 11.69 and 9.01 for seedlac manufactured through Integrated Small Scale Lac Processing Unit while mean lightness, redness and yellowness were 23.48, 10.13 and 7.48 for seedlac manufactured through Small Scale Lac Processing Unit, respectively with addition of washing agent (caustic soda) 0.100% by weight of sticklac after second batch washing operation (Table 3). For addition of washing agent (caustic soda) 0.2125% by weight of sticklac after second batch washing operation, mean lightness, redness and yellowness were 28.21, 11.19 and 9.13 and 22.20, 9.36 and 6.93, respectively for seedlac manufactured using Integrated Small Scale Lac Processing Unit and Small Scale Lac Processing Unit, respectively (Table 3). Mean lightness, redness and yellowness were 30.96, 13.47 and 11.34 for seedlac manufactured using Integrated Small Scale Lac Processing Unit while mean lightness, redness and yellowness values were 22.97, 8.71 and 6.68 for seedlac manufactured through Small Scale Lac Processing Unit, respectively with addition of washing agent (caustic soda) 0.425% by weight of sticklac after second batch washing operation (Table 3).

The values for lightness, redness and yellowness of the seedlac manufactured through Integrated Small Scale Lac Processing Unit (Fig. 4a) are better for almost all the treatments compared to seedlac manufactured through Small Scale Lac Processing Unit (Fig. 4b). It is also clear from Table 3 that with addition of higher amount of washing agent (caustic soda) within permissible limits based on type of lac washing *i.e.* golden, 3% and 5%, the lightness, redness and yellowness was improved compared to washing without addition of washing agent (caustic soda). Maximum lightness, redness and yellowness value were determined for seedlac manufactured through Integrated Small Scale Lac Processing Unit with 0.425% addition of washing agent (caustic soda) whereas minimum for without addition of washing agent (caustic soda) followed by 0.100% washing agent (caustic soda) addition by weight of sticklac. No clear trend in lightness, redness and yellowness values were observed in the seedlac manufactured through Small Scale Lac Processing Unit with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of sticklac (Table 3).

Table 2 : Standard values of quality parameters of seedlac (IS: 6921 - 1973)

Quality parameters	Sample No.				
	Special	A	B	C	D
Flow, mm	Depend on Buyer's & Seller's				
Life, min	Depend on Buyer's & Seller's				
Color index	8	10	12	18	30
Impurity, %	2.0 – 3.0	3.0 – 4.0	3.0 – 4.0	3.0 – 5.0	5.0 – 7.0
Acid value	65 -75	-	-	-	-
Moisture content, %	2.50 max	2.50 max	2.50 max	2.50 max	2.50 max
Wax content, %	2.5 – 5.5	-	-	-	-

Table 3 : Mean color parameters of seedlac manufactured through integrated small scale lac processing unit and small scale lac processing unit.

Amount of washing agent (soda) (% of sticklac)	Color parameters					
	Integrated small scale lac processing unit			Small scale lac processing unit		
	Lightness (L)	Redness (a)	Yellowness (b)	Lightness (L)	Redness (a)	Yellowness (b)
0.00	25.51 (±0.50)	12.06 (±0.34)	9.39 (±0.60)	19.69 (±0.71)	8.44 (±0.47)	5.94 (±0.44)
0.10	24.85 ± (0.20)	11.69 (±0.46)	9.01 (±0.31)	23.48 (±1.46)	10.13 (±0.57)	7.48 (±0.47)
0.2125	28.21 (±0.94)	11.19 (±0.44)	9.13 (±0.24)	22.20 (±0.64)	9.36 (±0.76)	6.93 (±0.21)
0.425	30.96 (±1.37)	13.47 (±0.64)	11.34 (±0.36)	22.97 (±2.88)	8.71 (±0.48)	6.68 (±0.50)

(a) Integrated small scale lac processing unit (b) Small scale lac processing unit

Fig. 4 : Manufactured Seedlac

Quality parameters

The quality parameters of seedlac manufactured from sticklac through Integrated Small Scale Lac Processing Unit was determined as per standard methods IS: 6921 – 1973 to confirm the quality parameters of manufactured seedlac with the standard values as detailed in Table 2.

Flow

The mean flow value of seedlac manufactured from sticklac without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of crushed sticklac through Integrated Small Scale Lac Processing Unit (ISSLPU) was determined separately for each treatment to compare the difference in flow values of seedlac. The mean flow value of seedlac was 50.33 mm, 47.00 mm, 43.67 mm and 54.00 mm, respectively for seedlac manufactured without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125, and 0.425% by weight of crushed sticklac through ISSLPU (Table 4). The flow values obtained for seedlac manufactured using Integrated Small Scale Lac Processing Unit were found within the acceptable limits in the domestic as well as overseas markets.

Life

The mean life value under heat of seedlac manufactured using Integrated Small Scale Lac Processing Unit without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of crushed sticklac was determined for each treatment separately to compare the difference in life values of seedlac as detailed in Table 4. Table 4 reveals that mean life value of seedlac was 44.67 min for without addition of washing agent (caustic soda), 43.33 min for washing agent addition (caustic soda) @ 0.100% by weight of crushed sticklac, 47.00 min for washing agent (caustic soda) addition @ 0.2125% by weight of crushed sticklac and 44.67 min for washing agent (caustic soda) addition @ 0.425% by weight of crushed sticklac after second batch washing operation, respectively for seedlac manufactured using Integrated Small Scale Lac Processing Unit (Table 4). Life values obtained for seedlac manufactured from sticklac through ISSLPU were found within the acceptable limit of buyers and sellers.

Color index

Average color index value of seedlac manufactured using Integrated Small Scale Lac Processing Unit without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of crushed sticklac was determined separately for each treatment to compare the difference in color index values of seedlac as detailed in Table 4. Table 4 reveals that mean color index value of seedlac manufactured through ISSLPU without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of crushed sticklac after second batch washing operation were 15.00, 9.33, 13.33 and 17.67, respectively (Table 4). The values of color index for each treatment were found within the range of acceptable limit (Table 2).

Hot alcohol insoluble (Impurity)

Hot alcohol insoluble (impurity) of seedlac manufactured using Integrated Small Scale Lac Processing Unit without addition of washing agent (caustic soda) and with addition of washing agent (caustic soda) @ 0.100, 0.2125 and 0.425% by weight of crushed sticklac was determined separately for each treatment to compare the difference in impurity content of seedlac (Table 4). The mean impurity content of seedlac manufactured were 2.55% for without addition of washing agent (caustic soda), 1.92% for washing agent (caustic soda) addition @ 0.100% by weight of crushed sticklac, 1.77% for washing agent (caustic

Table 4 : Mean quality parameters of seedlac manufactured through integrated small scale lac processing unit.

Amount of washing agent (caustic soda) (% of sticklac)	Quality parameters						
	Flow, mm	Life, min	Color index	Impurity, %	Acid value	Moisture content, %	Wax content, %
0.00	50.33 (±2.52)	44.67 (±3.06)	15.00 (±0.00)	2.55 (±1.14)	75.07 (±0.74)	0.65 (±0.01)	3.86 (±0.41)
0.10	47.00 (±8.19)	43.33 (±10.26)	9.33 (±1.15)	1.92 (±0.11)	74.48 (±1.10)	2.19 (±0.17)	5.01 (±0.49)
0.2125	43.67 (±1.15)	47.00 (±5.20)	13.33 (±2.89)	1.77 (±0.48)	73.60 (±0.07)	1.19 (±0.16)	3.94 (±0.42)
0.425	54.00 (±6.93)	44.67 (±7.64)	17.67 (±5.51)	1.92 (±0.47)	73.02 (±1.62)	1.87 (±0.33)	4.02 (±0.20)

soda) addition @ 0.2125% by weight of crushed sticklac and 1.92% for washing agent (caustic soda) addition @ 0.425% by weight of sticklac after second batch washing operation, respectively (Table 4). The values of hot alcohol insoluble (impurity) for each treatment were found within the range of acceptable limit *i.e.* 2.0 – 7.0% (Table 2).

Acid value

The mean acid value of seedlac manufactured using Integrated Small Scale Lac Processing Unit was determined separately for each treatment to compare the difference in acid value of seedlac (Table 4). The mean acid value of seedlac manufactured without addition of washing agent and with addition of washing agent @ 0.100, 0.2125 and 0.425% by weight of crushed sticklac were 75.07, 74.48, 73.60 and 73.02, respectively (Table 4). Acid value determined for manufactured seedlac using ISSLPU without addition of washing agent and with addition of washing agent were in conformity with the standard value (Table 2) of seedlac between 65 – 75.

Moisture content

The mean moisture content value of seedlac manufactured using Integrated Small Scale Lac Processing Unit was determined separately for each treatment to compare the difference in moisture content of seedlac as detailed in Table 4. Table 4 reveals that mean moisture content of seedlac manufactured using Integrated Small Scale Lac Processing Unit without addition of washing agent (caustic soda) was 0.65% and with addition of washing agent @ 0.100% by weight of sticklac was 2.19%, washing agent @ 0.2125% by weight of crushed sticklac was 1.19% and washing agent @ 0.425% by weight of crushed sticklac after second batch washing operation was 1.87%, respectively (Table 4). Moisture content were within the standard value 2.50% of seedlac (Table 2).

Wax content

Wax content of seedlac manufactured using Integrated Small Scale Lac Processing Unit was determined to compare the difference in wax content of seedlac manufactured without and with washing agent addition as detailed in Table 4. Mean wax content of seedlac manufactured using Integrated Small Scale Lac Processing Unit without addition of washing agent was determined to be 3.86% and with addition of washing agent after 2nd batch washing operation @ 0.100% by weight of crushed sticklac was 5.01%, respectively. For addition of washing agent @ 0.2125% and 0.425% by weight of sticklac after second batch washing operation, mean wax content value were determined as 3.94% and 4.02%, respectively. The mean value of wax content in the seedlac samples manufactured through ISSLPU were found in the range 2.5 – 5.5% for each treatments of washing agent addition.

All the quality parameters determined for the seedlac manufactured using developed integrated small scale lac processing unit were found within the standard limit as per IS: 6921–1973 (Table 2) for seedlac obtained after each treatment.

By- product recovery

To recover lac dye, by – product of lac industry, wash water obtained from batch washing during seedlac manufacturing from sticklac using ISSLPU was separately collected for each batches. The collected wash water of separate batch washing were treated for recovery of lac dye as per standard IS: 12921 – 1990 and lac dye was recovered. The lac dye recovered from wash water of batch washing were analyzed and observed that maximum dye was recovered from wash water of 1st batch washing with more than 50% dye content and lighter in color compared to lac dye recovered from wash water of subsequent batch washing.

Mean seedlac yield obtained for seedlac manufactured through the developed unit without and with washing agent addition does not show any appreciable difference. Mean impurity content in the seedlac manufactured through the developed unit was within the standard limit or acceptable standards exist in the market. Lightness, redness and yellowness of the seedlac manufactured using developed unit were higher for almost all the treatments compared to seedlac manufactured through Small Scale Lac Processing Unit. Addition of higher amount of soda within permissible limit improved the lightness, redness and yellowness of seedlac manufactured through the developed unit. All the quality parameters (flow, life, colour index, impurity, acid value, moisture content and wax content) determined for the seedlac manufactured from sticklac through the developed unit were found within the standard limit as per IS: 6921 – 1973. The size of seedlac manufactured from sticklac through the

developed unit was in accordance with the specification IS: 6921 – 1973. Maximum dye was recovered from wash water of 1st batch washing with more than 50% dye content and lighter in color.

Conclusion

Mean seedlac yield obtained for seedlac manufactured through the developed unit without and with washing agent addition does not show any appreciable difference. Mean impurity content in the seedlac manufactured through the developed unit was within the standard limit or acceptable standards exist in the market. Lightness, redness, and yellowness of the seedlac manufactured using developed unit were higher for almost all the treatments compared to seedlac manufactured through Small Scale Lac Processing Unit. Addition of the higher amount of soda within the permissible limit improved the lightness, redness, and yellowness of seedlac manufactured through the developed unit. All the quality parameters (flow, life, color index, impurity, acid value, moisture content, and wax content) determined for the seedlac manufactured from sticklac through the developed unit were found within the standard limit as per IS: 6921 – 1973. The size of seedlac manufactured from sticklac through the developed unit was in accordance with the specification IS: 6921 – 1973. Maximum dye was recovered from wash water of 1st batch washing with more than 50% dye content and lighter in color.

समेकित लाख प्रसंस्करण इकाई द्वारा चौरी लाख का निर्माण : एक औद्योगिक उत्पाद

सतीश चन्द्र शर्मा, निरंजन प्रसाद एवं संजय कुमार पाण्डेय

सारांश

उत्पादन, रंग एवं गुणवत्ता मानकों में परिवर्तन को समझने के लिए विकसित किये गए समेकित लघु लाख प्रसंस्करण इकाई के द्वारा विभिन्न उपचारों के साथ छिली लाख से चौरी लाख का निर्माण किया गया। विकसित किये गये इकाई द्वारा धुलाई घटक के विभिन्न उपचारों के साथ निर्मित किये गये चौरी लाख के प्राप्त औसत उत्पादन में कोई उल्लेखनीय भिन्नता नहीं मिली लेकिन औसत अशुद्धता मानक सीमा के अन्दर पायी गयी। समेकित इकाई के द्वारा निर्मित चौरी लाख का रंग सूचकांक समान उपचार के साथ लाख प्रसंस्करण की लघु इकाई के द्वारा निर्मित चौरी लाख की तुलना में बेहतर पाया गया। अनुमेय सीमा के अन्दर धुलाई घटक की अधिक मात्रा डालनें से, लाख प्रसंस्करण की लघु इकाई के उपयोग से निर्मित किये गये चौरी लाख की तुलना में विकसित किये गये समेकित इकाई के उपयोग द्वारा निर्मित चौरी लाख का चमक, लालपन एवं पीलापन में सुधार पाया गया। समेकित इकाई के उपयोग द्वारा धुलाई घटक के विभिन्न उपचारों के साथ निर्मित चौरी लाख के सभी गुणवत्ता मानकों की जाँच की गयी तथा मानक मान आईएस: 6921-1973 के अनुसार स्वीकार्य सीमा के भीतर पायी गयी। विकसित किये गये समेकित इकाई के उपयोग द्वारा छिली लाख से निर्मित चौरी लाख के दानों का आकार लाख प्रसंस्करण की लघु इकाई के उपयोग से निर्मित चौरी लाख के दानों के आकार के समान ही पाया गया जो की मानक मान आईएस: 6921-1973 के अनुसार था तथा पानी में घुलनशील अधिकतम लाख डाई (लाख उद्योग का एक उप-उत्पाद) पहले बैच की धुलाई के पानी से अधिक मात्रा में प्राप्त किया गया जिसमे 50 प्रतिशत से अधिक चमकदार डाई था।

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