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Sweet and Tender Green Sorghum (*Sorghum bicolor* L. Moench) Seed (Pauk.) Processing in South Gujarat of India

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Abstract

Sorghum (*Sorghum bicolor* L. *Moench*) is the varsities crop due to its adaptability in almost all odd conditions, which rank third among India's cereal production. The green, tender but roasted sweet sorghum grain is known as *pauk* in south Gujarat. A systematic survey was carried out for two years in south Gujarat districts covering; Bhruch, Surat, Tapi, Navasri and Valsad. *Wani* was reported as the *pauk* (*Hurda)* processing purpose sweet sorghum varieties in the surveyed area. Small and marginal farmers as well as small to medium entrepreneurs are involved in *pauk* processing during winter season every year. Fifty five *pauk* processing centers were survey using predefined terms and questionnaires. The roasting, threshing (beating) and cleaning are three main steps for processing of *pauk* . The average processing capacity of *pauk* center was varied about 80 kg/day to 10 kg/day. The hygiene condition of *pauk* center surrounding was not suitable for food processing. There is a tremendous scope for improvement and mechanization of *pauk* processing operations. There is a need to develop tools and machineries for improving the capacity of sweet and green tender sorghum seed processing operations.

Key words : *Sorghum processing, pauk , pauk processing, hurda processing survey.*

Introduction

Sorghum (*Sorghum bicolor* L. Moench) is the most important food, fodder and industrial crop of dry land as well as poor soil agriculture. In the world, sorghum is cultivated over 43.93 million hectares in 98 countries with an average yield of 1.4 MT/ha. Among the cereals in India, sorghum ranks third, next to rice and wheat with area under this crop 6.08 million hectares and 0.70 MT/ha of productivity during 2015-16 (1). Maharashtra, Karnataka, Andhra Pradesh, Gujarat, Tamilnadu and Madhya Pradesh are the major sorghum growing states. As regards over the environment highest percent contribution showed by lines for protein content in fodder (72.67), by testers for days to maturity (20.61) and line x tester interaction by grain yield per plant (69.32). In Gujarat, it occupied an area of about 1.03 lakh hectares with a productivity of 1340 kg/ha during 2015-16. In Gujarat, the sorghum is mainly grown for feed and fodder during *kharif* season while for grain during *rabi* season. The important reported sorghum varieties in Gujarat are; BP 53, SURAT 1, GJ 108, GJ 38, GJ 42, solapuri, *WANI*, GFS 5, CVS 21F and GNJ-1.

The sweet and tender green seed of sorghum at soft dough stage i.e. before physical maturity are known as *pauk* or *Hurda.* The cleaned tender green sweet sorghum seed (*pauk*) are used to consume in various way in Gujarat, Rajasthan and Maharashtra (3, 4, 5). Under AICSIP, *Wani, PKV* Ashwini, Phule Amruta, SGS 8-4 and *Sakkari Mukkari* Jola have reported as '*Hurda (pauk)'* purpose sorghum varieties by ICAR (Patil, et al., 2013). The *pauk* purpose sorghum is planted normally in the month of July-October and harvested during January-March (6). Small and marginal farmers as well as small to medium entrepreneurs are involved in cultivation of *pauk* purpose varieties as well as *pauk* processing during winter season. One can find, *pauk* processing huts at high way or road side particularly between Bharuch to Dangs district of Gujarat. These *pauk* processing huts are known as *pauk* centers. A survey was conducted to find the technical, health and hygiene as well as economical constraint and scope for improvement in *pauk* processing centers.

Research Methodology

A systematic survey was conducted within south Gujarat particularly; Bharuch, Surat, Navsari, Valsad and Dangs District of Gujarat using predefined terms and questionnaires. There were total twenty four main questionnaires which have further sub questions. Total fifty numbers of *pauk* processing centers were surveyed for getting information about technical, health and hygiene as well as economy of process. The geographical 'Google Map' location in terms of altitude and latitude for each center was noted. The video and photograph was taken for *pauk* processing as well as health and hygiene steps record purpose. The technical process parameter was

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measured using digital thermometer (Make: Traceable fisher bran, India; Range : -50ºC to 300ºC ± 1ºC), measuring scale (Length: 30cm; Least Count: 0.5mm) and stop watch (Make: Racer, India Model:1/100s). During survey, it was tried to get true and realistic data about economy, number of labors, wedges for labor, cost of inputs, profit, etc. by cross checking the same questionnaires with labors, wood suppliers, raw sorghum supply vehicle drivers, consumers and farmer's family members.

Results and Discussion

The collected data are statistically analyzed for mean, maximum, minimum and the information generated. The expenditure, income and benefit in *pauk* processing were calculated on the basis of recorded data. The following information was generated from survey.

The Wani variety, of sweet and tender green sorghum seed was reported as *pauk* processing purpose raw material. The generalized process flow chart for sweet and tender green sorghum seed processing is given in figure indicated that, roasting, threshing (beating) and cleaning are three main steps for processing of *pauk (*Figure-1*).* It was reported that processing of *pauk* begins early in the morning around 06:00 a.m. and continue up to night around 09:00 p.m. The necessary tools like; kin, sieve and *Supada* were observed to be utilized by *pauk* processors, which found to be local artesian made for seasonal use. The bamboo stick and cotton cloth were purchased from local market to use in *pauk* processing.

Sweet and tender green sorghum head

Pre-processing operation: De-leafing of sorghum head

Roasting of sorghum head in hot sand

Beating of sorghum head in thick cloth with bamboo stick

Collection and cleaning of sweet and tender green sorghum seed

Storage under shade in bamboo basket covered with thin cloth for sale at center.

Figure-1 : Process flow chart for processing of sweet and tender green sorghum seed *pauk*.

Technical Information about *pauk* Processing Units of South Gujarat : The Table-1 represents the compiled technical information with respect to complete manual *pauk* processing from surveyed 55 responders. Looking to the surveyed data analysis, 750mm, 300mm, 60mm, and 100g could be taken as reference values for the *pauk* roaster design as well as *pauk* thresher design purpose for the sweet sorghum stalk length, head length, head diameter, and weight, respectively. Surveyed data analysis reveled that, 180s, 280ºC, 74ºC, and 5.5% should be taken as minimum reference values of the *pauk* roaster design purpose for the roasting time, roasting temperature, temperature difference stalk head before and after roasting, change in moisture content of stalk head, respectively. The analysis surveyed data in table indicated that, 45s, 60Nos/min and 4Nos should be taken as minimum reference values for the *pauk* thresher design purpose for the threshing time, beating stroke and numbers of sorghum stalk head taken for beating purpose at a time, respectively. Average threshed *pauk* cleaning time was reported 180s. Maximum weight of sorghum stalk taken for processing purpose, *pauk* processed in a day and *pauk* recovery were reported 170kg/day, 80kg/day and 47.06%, respectively. Maximum numbers of unskilled; killed as well as semiskilled labors involved in 55 manual *pauk* processing units surveyed were reported 19Nos, 6Nos and 2Nos, respectively. It indicated that, as the processing capacity of manual processing unit increased, more numbers of work forces is required, where as small capacity unit required less numbers of labors. It was observed that, large numbers of work force is involved in the manual *pauk* processing methods. During the survey, capacity of *pauk* processing units was calculated and reported as frequency analysis bar chart in the Figure-1. It indicated that 3Nos, 23No, 25Nos, 2Nos and 2Nos of units processed less than 10kg/day, between 10-20 kg/day, between 20-50 kg/day, between 50-70 kg/day and between 70-80 kg/day, respectively. About 87% of processing unit production capacity was found in the range between 10kg of *pauk* per day to 50kg of *pauk* per day.

***Pauk* Roasting, threshing and Cleaning Parameters at Manual Processing Units :** Table-2 describe the various observation related to manual *pauk* processing steps, included sorghum stalk used in a day and performance of roasting, beating as well as cleaning operations. Maximum performance of roasting, threshing and cleaning operations in *pauk* grain processing was reported 85.14%, 89.61% and 99.31%, respectively.

Characteristics of Sorghum Stalk, stalk Head and Seed for *pauk* Processing in Manual Method : The stalk of sweet sorghum is divided in two parts; stalk head, which has *pauk* grain and stalk stem, which look like a stick like and not containing any seed or grain. The characteristics of sweet sorghum stalk, stalk head and pauk grain are reported in Table-3. Average *pauk* grain per head was reported 40.42g with elliptical shape. The

Table-1 : Technical information with respect to manual *pauk* processing.

Particular	Lss, (mm)	Lh, (mm)	Dh, (mm)	Wh, (g)	Rt, (s)	R_T, (°C)	T_{shbr}, (°C)	T_{shar}, (°C)	MC_{shbr}, (%w.b.)	MC_{shar}, (%w.b.)
Average	703	175	40	100	170	250	24	85	59.43	54.76
Max.	750	290	60	125	180	280	24	95	65.42	63.32
Min.	675	100	30	75	150	230	23	75	55.87	48.69
Range	75	90	30	25	30	50	1	20	9.55	14.63
Particular	Bt, (s)	Bs, (No/min)	N_{sh}, (No)	Ct, (s)	Wss, (kg/day)	*P*p, (kg/day)	*P*r, (%)	USL, (Nos)	SL, (Nos)	SSL, (Nos)
Average	40	60	2	180	56	26	46.43	5	2	2
Max.	45	65	4	182	170	80	47.06	19	6	6
Min.	35	53	2	166	20	10	50.00	1	1	1
Range	10	12	2	16	150	70	2.94	18	5	5

Lss = Length of Sorghum Stalk,(mm); Lh = Length of Head,(mm); Dh = Diameter of Head,(mm); Wh = Weight of a Head, (g); Rt = Roasting Time,(s); R_T = Roasting Temperature,(°C); T_{shbr} = Temperature of Sorghum Stalk Head Before Roasting, T_{shar} = Temperature of Sorghum Stalk Head After Roasting, MC_{shbr} = Moisture Content of Sorghum Stalk Head Before Roasting, MC_{shar} = Moisture Content of Sorghum Stalk Head After Roasting, N_{sh} = Number of sorghum stalk head taken for beating at a time, Bt = Beating Time,(s); Bs = Beating Stroke, (No/min); N_{sh}, (No); Ct = Cleaning Time, (s); Wss = Weight of Sorghum Stalk, (kg/day); *P*p = *pauk* Production, (kg/day); *P*r = *pauk* Recovery, (%); USL = Unskilled Labour Involves, (Nos); SL = Skilled Labour Involves, (Nos); SSL = Semi-skilled Labour Involves, (Nos)

Table-2 : Roasting performance in manual *pauk* processing method.

Particular	Weight of Sorghum Stalk Used, (kg/day)	*pauk* Production, (kg/day)	# Roasting Performance, (%)	# Threshing Performance, (%)	#Cleaning Performance, %
Average	56	26	84.69	88.76	99.35
Max.	170	80	85.14	89.61	99.31
Min.	20	10	84.21	87.78	99.22
Range	150	70	0.93	1.83	0.09

Performance given here is with respect to processing capacity.

Table-3 : Characteristics of sorghum stalk, Head and Seed for pauk processing in manual method.

Parts	Stalk and Stem							Head			Seeds					
Particular	Lss, (mm)	Wss, (g)	ARss (º)	Nss, (No)	Ls, (mm)	Ds, (mm)	MCs, (%)	MCh, (%)	Wgh, (g)	A, (mm)	B, (mm)	C, (mm)	Dg, (mm)	W_{1000}, (g)	MCpg (%)	ARpg (°)
Average	703	100	67.85	10	440	4.95	16.54	54.76	40.42	4.8	4.3	1.8	3.3	32.4	61.43	37
Max.	750	180	69.23	6	450	6.24	21.15	63.32	52.51	5.4	4.9	2.3	3.9	35.3	64.58	42
Min.	675	70	65.43	14	410	3.90	13.25	48.69	30.68	3.6	3.4	1.3	2.5	30.3	58.25	35
Range	75	110	3.80	8	40	2.34	7.9	14.63	21.83	1.8	1.5	1.0	1.4	5.0	6.33	7

Lss = Length of Sorghum Stalk,(mm); Wss = Weight of a Stalk,(g); ARss = Angle of repose of the sorghum stalk (º); Nss= Numbers of stalk in 1kg of weight, (No); Ls = Length of Stem, (mm); Ds = Diameter of Stem,(mm); MCs = Moisture content of Stem, (%);MCh = Moisture content of Head, (%); Wgh = Weight of grain per Head, (g); A = Major dimension of *pauk* seed grain (mm); B = Primary minor dimension of *pauk* seed grain (mm); C= Secondary minor dimension of *pauk* seed grain (mm); Dg = Geometric mean diameter of *pauk* seed grain (mm), W_{1000} = Weight of 1000 *pauk* seed grain (g); MCpg = Moiture Content of *pauk* grain seed, (%); ARpg = Angle of repose of the *pauk* grain (º)

tabulated data could be useful for design and development of *pauk* roasting and threshing machine.

Economics of Surveyed Manual *pauk* Processing Units : The expenditure made by surveyed 55 *pauk* processors with respect to primary operations cost, roasting operation cost, beating operations cost, cleaning operations cost, packing operation cost with further classifications as expenditure behind raw materials, labors, fuels, consumables, operational, fixed and marketing cost also indicated in Table-4.

Average operation period in a season for *pauk* processing purpose was reported 120days. Average total expenditure behind fixed assets and consumables was reported Rs.10,40,542/- per season. The data indicated that, less than 3% total expenditure was behind fixed assets, while almost 97% expenditure for consumables.

Table-5 and 6 represented the economics related

Table-4 : Expenditure on pauk processing in manual method in 2019-20.

Particular	Roasting Tools, Rs.	Beating Tools, Rs/Pc	Cleaning Tools, Rs./Pc	Other Facilities, Rs.	Working Season, Days (Months)	Sor-ghum Stalk, kg/day	Rate, Rs/kg	Fuel (wood), kg/day	Rate, Rs/kg	Primary Prepara-tion Labour, Nos	Wages Rs/day
Average	10636	260	325	6745	105 (3.5)	56	95	165	7	1	204
Max.	22200	260	325	10000	120 (4)	170	100	600	10	3	250
Min.	7200	260	325	3000	90 (3)	20	80	60	5	0	200
Range	15000	-	-	7000	30 (1)	150	20	540	5	3	50

Particular	Roasting Labour, Nos	Wages Rs/day	Beating Labour, Nos	Wages Rs/day	Cleaning Labour, Nos	Wages Rs/day	Packing and Marketing Labour, Nos	Wages Rs/day	Rent and Tax, Rs/ Season	Consum able, Rs/ Season	Expendit ure, Rs/ Season
Average	2	479	4	400	1	300	1	300	12011	1021766	1040542
Max.	6	500	16	500	4	400	3	400	24000	2760975	2798635
Min.	1	450	1	350	1	250	0	250	300	413850	424635
Range	5	50	15	150	3	150	3	150	23700	2347125	2374000

Note :
Fixed Assets : Roasting Tools : Kin, Spade, Scoop; Beating Tools : Cloth & Sticks; Cleaning Tools : Supada, Screen No-9, Tagara; Other Facilities : Table, Weighing balance, Chairs, Tent, Sealing machine.
Consumable : Raw material cost, Fuel, Labour Wedges, Packing Material, Staple Pin, Food, Water, Plastic, Rent, Tax, etc.

Table-5 : Economics of manual pauk processing units during 2019-20.

Sr. No.	*Pauk* Processing Experience,	pauk Rate,	pauk Production,	Working Season,	Income,	Expenditure,	Profit,
Unit	Years	Rs/kg	kg/day	days	Rs	Rs	Rs
Avg.	12	460	26	105	1223373/-	1040542/-	182830/-
Max.	30	500	80	120	3600000/-	2798635/-	801365/-
Min.	2	420	10	90	470000/-	424635/-	11275/-
Range	28	80	70	30	3130000/-	2374000/-	790090/-

Table–6 : Number and types of labors in various operations of manual pauk processing in 2019-20.

Operations	Primary preparation	Roasting	Beating	Cleaning	Packing and Marketing	Total Labors
Types of Worker	Unskilled	Skilled	Skilled	Semi Skilled	Semi Skilled	
Average	1 (204/-)	2 (479/-)	4 (400/-)	1 (300/-)	1 (300/-)	9
Max.	3 (250/-)	6 (500/-)	16 (500/-)	4 (400/-)	3 (400/-)	31
Min.	0 (200/-)	1 (450/-)	1 (350/-)	1 (250/-)	0 (250/-)	3
Range	3 (50/-)	5 (50/-)	15 (150/-)	3 (150/-)	3 (150/-)	28

Note : Information in parenthesis are wages of labour for particular operation.

information with respect to *pauk* production capacity and experience. Average income of *pauk* processor was reported Rs.12,23,373/- per season. Thus the average, maximum and minimum net profit from *pauk* processing was reported Rs.1,82,830/-, Rs.801365/- and Rs.11275/- per season, respectively with range Rs.7,90,090/- per season among 55 observed value. The data indicated that, experienced unit invest more in the *pauk* processing business compared to less experienced. The income of experienced units was observed to be almost 7.6 times more compared to new units. Accordingly, profit was also observed higher for experienced higher capacity *pauk* processing unit compared to new and lower capacity unit. Figure–1 shown the frequency distribution of Nos of *pauk* processing units with respect to profit.

Manpower Involved in Surveyed Manual *pauk* Processing Units : Table-7 indicated the types of labours and their wages during 2019-20 with respect to operations for *pauk* processing like; primary preparation, roasting, beating, cleaning, packing and marketing. Average,

Table–7 : Classifications of labours involved in *pauk* processing on the basis of various criteria.

Particular	Contract			Skill			Gender	
Types of Worker	Family	Contractual	Hired	Unskilled	Semi-Skilled	Skilled	Male	Female
Average	2	2	5	5	2	2	7	2
Max.	2	8	21	19	6	6	26	5
Min.	1	0	1	1	1	1	2	1
Range	1	8	20	18	5	5	26	2

Table-8 : Microbial load at various stages of manual *pauk* processing operations.

Particular	Plate count (cfu/g)				
Operations	After Pre-processing	After Roasting	After Beating	After Cleaning	At Marketing
Average	480	189	270	438	586
Maximum	640	234	468	576	754
Minimum	520	84	186	256	344
Range	120	150	282	320	410

maximum and minimum total numbers of labours for *pauk* processing purpose was reported 9Nos, 31Nos and 3Nos, respectively. Looking to the maximum value, the ratio of unskilled, semi skilled and skilled labours was reported to be 3:1:1. For the maximum value of data, the male to female ration was observed to be 83:15. Data indicated that, it was labours oriented units and required mechanization to reduce the dependency on that workforce. The highest labour requirement was observed for beating operations followed by roasting and cleaning. Figure–1 indicated that, the 12Nos, 27Nos, 10Nos, 3Nos and 3Nos of *pauk* processing units were engaging total numbers of workers in the range of less than 3Nos, 3-10Nos, 10-17Nos, 17-24Nos and 24-31Nos, respectively.

The data indicated that, the requirement of labour, fuel and fixed (tools) cost in manual roasting increased almost 6 times, 3 times and 10 times between minimum and maximum sorghum processing capacity for *pauk* purpose. The capacity of *pauk* grain processing unit do not have much impact on roasting performance of as it did not shown major change in performance i.e. less than 1%. Similarly, the requirement of labour and beating time in manual roasting increased almost 16 and 1.3, respectively between maximum and minimum sorghum *pauk* processing capacity. The capacity of *pauk* grain processing unit do not have much impact on threshing performance of as it did not shown major change in performance i.e. less than 2 %. The data also indicated that, the requirement of labour and cleaning time in manual roasting increased almost 4 times and 1.1 times between minimum and maximum sorghum processing capacity for *pauk* purpose. The capacity of *pauk* grain processing unit do not have much impact on cleaning performance of as it did not shown major change in performance i.e. less than 0.1%. All the operations of manual *pauk* processing is shown in Figure-2.

Hygiene and Sanitation in Surveyed Manual *pauk* Processing Units : As far as hygiene and sanitation concern, following points were observed during the survey of 55 *pauk* processing units.

Hand washing facility, working cloth change room area, urinal area, wash room area, kitchen as well as food eating area, etc. were not observed in any processing units.

All processing operations were carried out under open shade, where lots of dust, wind and smoke movement observed. Even roasting, beating and cleaning operation ground was observed with lots of city waste and debris.

The temporary green shade net or used plastic sheet was used to prepare sale counter or sometimes shade for rest to workers, beating as well as cleaning operation.

No workers including roasting labour used safety gloves, cap, shoes, goggles, mask, etc.

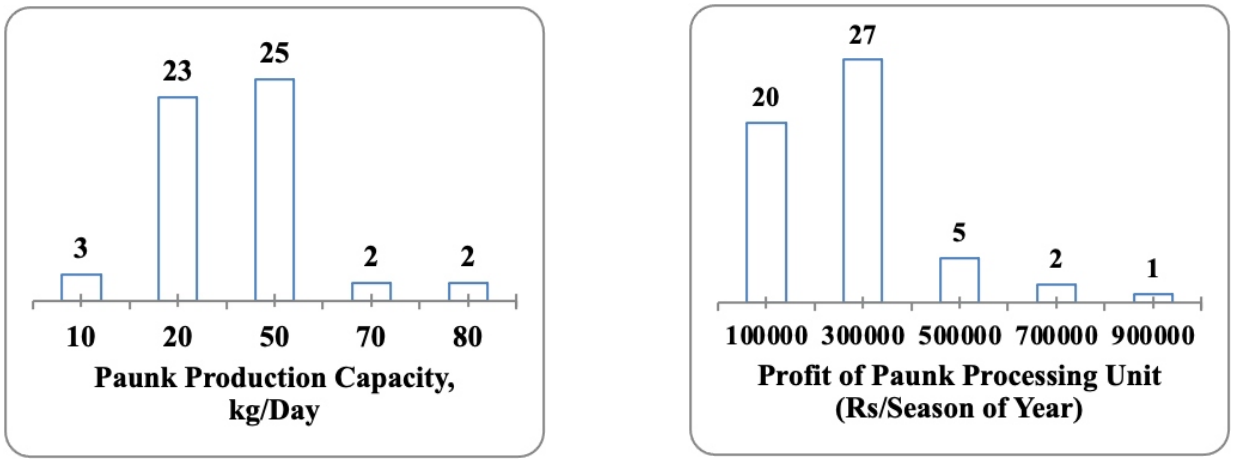
No safety sign or emergency procedure signboards were observed in any of *pauk* processing unit.

Almost all the labors were wearing his or her own cloths, cap and *dupatta* or scarf as nose mask.

Lots of soil deposition was observed in cleaning tool like *supada* as well as beating tool cloth. After every day operations, workers wash their *supada* and cloth followed by natural drying during night.

Children of workers play on raw material and creating unhygienic conditions.

The microbial samples were also collected at every stage of manual processing and compiled ain Table–8. In large capacity units most of the workers were staying in the nearby hut, so table indicating that there was heavy microbial load at every step of *pauk* processing



Figure–1 : Frequency of *pauk* processing units with respect to production capacity, fuel use, cop for roasting operation, profit and employment of total worker.

Figure–2 : Manual *Pauk* Processing Operation in Gujarat during 2019-20.

operations. Average microbial load after pre-processing; roasting; beating; cleaning and at marketing stage was recorded 480cfu/g, 189cfu/g, 270cfu/g, 438cfu/g and 586cfu/g, respectively among 55 observations.

In general, conditions of *pauk* processing area were observed unhygienic as well as no sanitation facilities were observed. If fixed assets investment were observed, it could be clearly understand that, with such a small investment, hygienic conditions of processing unit could not be expected.

The seed of this variety was small in size having 3.3 ± 0.65mm average diameter, lush green and tender with average firmness 0.3 ± 0.1 kgf. It has mild sweet taste and release specific flavor while mastication. Aroma from roasted seed was giving touch of traditional village or orchard food. The seed are observed to be consumed with hot, sour and pungent vermicelli (Katti-Tikhi-Chatpati Sev) as well as sugar ball (Sankariya). All the sweet and tender green sorghum seed processing centers also keep the packets of vermicelli and sugar ball along with *pauk* for sell. The sorghum for *pauk* processing purpose is harvested at soft dough stage i.e. before physical maturity, particularly in early morning before due sets in the field. After harvesting the sorghum head, it is transported to *pauk* center by loading in tractor or small carrier vehicle. Kikwad, Pipariya, Borbhatha, Tariya, Juna Kasiya, Vankal, Vadhava, Kapaliya, Bhatpur, Pal Bhatha, Nabipur, Kargar, Sapara, Karanj Khed, Dharmpur, Jujwa, Pathari, Parnera, Koshmal, Chankhal, Jarsol, Masali, etc. villages having Wani variety cultivation and so, most of

the supply is mainly from these areas. The rent for vehicle is ranging between 5-18 Rs/kg, which also depends on distance to be travels. The roasting was carried out using hot black stone sand having average particle size 0.25 ± 0.05mm. The heating of sand was done by burning the wood in open kin. The sorghum head was kept under the hot sand for about 2-4min. During roasting, one or two semi-skill labors were observed to be engaged for spreading the hot sand on sorghum head using wooden spoon as well as to control the over burning of seed. All the labors were observed to be male. The hot sand temperature on the kin was observed above 230ºC. It is unbearable hot working place with flame, dust and heat.

The threshing was carried out manually by beating the roasted sorghum head using bamboo stick having average size 250mm x Ø 12mm after covering thick cotton cloth having dimension 1.5 m x 1.5 m. Maximum numbers of labors were observed to be involved in this operation. A master labor used to supply the roasted sorghum head to other unskilled labor continually. The numbers of labors involved in this operations were depends upon the capacity of *pauk* center. Minimum one labor and maximum fifteen labors were reported for small center and medium center respectively for beating operation. Generally they used to work under shade. All the labors were observed to be male.

The cleaning was observed to done by manually using round sieve having 14 or 12 mesh size and 9 number *supada*. The female labors collect the threshed material, which was observed to be a mixture of grains, husk, straw, etc. Generally, four to six female labors were observed for cleaning operation. The operation is carried out in open condition. The clean grains were collected at the end of cleaning operation for sale and further consumption purpose.

There were two method of procurement of sorghum head reported. In first method owner of center purchase the field and go for his own operation for harvesting. In second method, he used to buy harvested sorghum head from farmers or traders. In first methods, the risk of damage to crop due to pest, insect, birds, due, rain, cold wave, theft of crop was reported. In second method, problems related to shortage of supply, poor quality, mix variety, unstable price of sorghum head was reported. Handling of labor was reported to be the main crucial task for regular supply of processed *pauk* to consumer. The owner of *pauk* center generally pays about 100 to 200 Rs higher wedges to roasting labor than others. The breakfast, lunch and two time tea were provided to all the labour. The unsold sweet and tender green sorghum seed spoil within two days due to unhygienic environment. To avoid that, the *pauk* center dried it under the fan for off season sale and utilization. *Pauk-wada,* and *pauk-Sev* were observed to be secondary business mainly dependent on availability of sweet and green tender sorghum seed.

The processing operations observed to be inefficient and with low capacity. There is a tremendous scope for improvement and mechanization of *pauk* processing operations. There is a need to develop tools and machineries for improving the capacity of sweet and green tender sorghum seed processing operations.

Conclusions

The *pauk* processing is seasonal and unorganized entrepreneurship mainly involving small and marginal/ medium farmers. It has tremendous scope for improvement as far as technology, engineering as well as health and hygiene is concern. There is a need to develop tools and machineries for improving the capacity of sweet and green tender sorghum seed processing operations using information generated in this survey.

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