Report on a visit to Tanzania to review ram presses for Appropriate Technology International.

12 February - 5 March 1993

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<td>ATI</td>
<td>Appropriate Technology International</td>
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<td>CAMARTEC</td>
<td>Centre for Agricultural Mechanisation and Rural Technology</td>
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<tr>
<td>CAPU</td>
<td>Craftsmen and Artisans Production Unit</td>
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<td>NRI</td>
<td>Natural Resources Institute</td>
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<td>TSh</td>
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Currency (official rate):

- TSh 484 approximately equal to £1
- TSh 323 approximately equal to $1
SUMMARY AND CONCLUSIONS

1. This visit report provides details of the main findings of a study (carried out during 13 February - 5 March 1993) of ram presses in use in Tanzania. The assignment was undertaken on contract by Tony Swetman (Oilseed Technologist) of the Natural Resources Institute (NRI) on behalf of Appropriate Technology International (ATI).

2. A total of twelve ram presses being used under field conditions for sunflower seed processing were tested. These comprised four of the original large ram press introduced in 1985 (Nand Singh type); five of an intermediate size introduced in about 1989 (CAPU type); and three of a smaller version of the press introduced in 1991 (CAMARTEC type).

3. The following extrapolated throughput and yield figures were recorded using the three press types to process 50 Kg "Record" variety sunflower seed:

   * Nand Singh (two operators):
     output - between 12.9 and 17.4 litres of crude oil,
     throughput - between 10.3 and 18.8 kg seed per hour;

   * CAPU (one operator):
     output - between 11.3 and 17.5 litres of crude oil,
     throughput - between 7.1 and 25.0 kg seed per hour;

   * CAMARTEC (one operator):
     output - between 12.7 and 16.5 litres of crude oil,
     throughput - 5.3 to 14.3 kg seed per hour.

   The presses are progressively more arduous to operate as they increase in size.

4. The author was accompanied for some of the time by Carl Bielenberg (ATI engineer and inventor of the original ram press) who assessed wear characteristics of the various presses. He expressed concern over the wear of certain components (including tie-bars and swivel pins) of the CAMARTEC presses which had occurred during relatively short operating periods.

5. The original Nand Singh press is no longer in production in Tanzania. Both the CAPU and CAMARTEC presses are still being made. The Village Oil Press Project (VOPP) is currently only promoting the CAMARTEC press.

6. It was concluded that, although the CAMARTEC press has potential for addressing the needs of the target market for presses (smallholder farmers and women) it would benefit from being strengthened. The author recommends that three strengthened presses be tested thoroughly and monitored regularly over a three month period during the sunflower harvesting season at three
separate sites in Tanzania. This testing is considered essential in order to assess the robustness of the CAMARTEC press.

7. A strengthened CAMARTEC press was tested for performance and was found to produce 15.5 litres of crude sunflower seed oil per 50 kg bag at a throughput of 7.1 kg seed per hour. This compares favourably with figures achieved with the earlier CAMARTEC version. CAMARTEC staff estimate that the strengthened press will increase in price from Tsh 35,000 to between Tsh 45,000 and Tsh 50,000 as a result of this strengthening. The durability, sunflower seed throughput and oil yield of the CAPU press have been proven. The durability of the existing CAMARTEC press is in doubt. The current price of a CAPU press has been estimated by CAMARTEC staff at about Tsh 120,000.

8. Based on the findings of this survey, it would be prudent to monitor more closely the performance of the CAMARTEC press and to then promote its wider application, but not to the exclusion of the CAPU press.

Other principal technical findings were:

9. Increasing the stroke rate of the ram press increased the throughput of sunflower seed at the expense of yield.

10. A CAMARTEC press was tested using groundnut kernels, and both a CAMARTEC press and a CAPU were tested using sesame seed. The following throughput and yield figures were recorded for 50 Kg amounts of seed:

* CAMARTEC
  Groundnut kernels:
  output - between 14 and 16 litres of crude oil;
  input - 5 kg kernels per hour.

  Sesame seed:
  output - between 18 and 22 litres of crude oil;
  input - 4 kg seed per hour.

* CAPU
  Sesame seed:
  output - 15.9 litres crude oil
  input - 7 kg per hour.

11. Oil extraction efficiencies are higher when both sesame seed and groundnut kernels are heated over a boiling water bath compared with sun heating. The temperature attained by the seed in the water bath was around 20°C higher than that achieved by sun heating.

12. It is recommended that a comprehensive field trial be undertaken using the two press types to determine the performance and financial viability of processing sesame seed and groundnut kernels. The high yield of oil from
sesame seed using the CAMARTEC press is worthy of further investigation. There is potential for user uptake of the press for processing both these crops not only in Tanzania but in other African countries.

13. Simple financial feasibilities are presented for both the CAMARTEC and CAPU press based on observations of throughput and yield made during this visit.

TERMS OF REFERENCE

14. The following are the terms of reference drawn up prior to the visit:

15. To carry out field testing in Tanzania on ten selected ram presses (to include three first generation presses, three CAPU presses and four CAMARTEC presses).

16. To set up, carry out and report on press performance tests which measure the quantity of seed used, the quantity of oil produced and the elapsed time. Also to provide descriptive information about the condition of the press, the temperature, moisture content and cleanliness of the seed, the weather conditions, the clarity of the oil produced, the method of clarification used and other relevant information.

17. To compile qualitative data on each press including the ease of operation, durability, perceived profitability, and the overall owner/user satisfaction with the different press models.

18. To determine oil content of seed and cake samples retained from each press.

19. To prepare a report to include a brief quantitative and qualitative description of the tests performed at each site and a summary of the relative performance data (yield and throughput) of the various presses and seeds tested.

20. To review and make comments on the ram press operators' manual.

21. The following additional tasks were performed following consultation with Jeanne Downing (Manager, Africa Programme, ATI), Carl Bielenberg (ATI engineer), Lynn Schlueter (Director, VOPP) and Erwin Protzen (Technical Director, CAMARTEC) after arrival in Tanzania:

22. To carry out performance trials using both the CAMARTEC and CAPU presses to process sesame seed and groundnut kernels both after heating on a water bath and heating in the sun.

23. To review differences in throughput and oil yield obtained by (i) varying the handle stroke rate when processing sunflower seed in a CAPU press and (ii)
widening the cage gaps when processing both sesame seed and sunflower seed using a CAPU press.

24. To review the difference in performance when using the CAMARTEC press fitted with both a 30mm ram and a 40 mm ram to process groundnut kernels.

FIELD VISITS

25. A total of twelve ram presses being used under field conditions for sunflower seed processing were tested. These comprised four of the original large ram press introduced in 1985 (Nand Singh type); five of an intermediate size version introduced in about 1989 (CAPU type); and three of a small version of the press introduced in 1991 (CAMARTEC type).

26. The author was accompanied by the workshop manager from CAMARTEC (Livinous Manyanga) on all visits to press sites and by Carl Bielenberg on visits to CAMARTEC and CAPU presses.

27. "Record" variety sunflower seed was used to test the various ram presses enabling direct comparisons to be made both within press types and between the three press types.

28. Throughput and yield data were collected from each press and their performance are reported below. All weights were taken using a portable battery-operated balance capable of weighing 5 Kg to an accuracy of one gram. Temperature measurements were carried out using a temperature probe.

29. Where local operators were available, they were used to operate the presses. If labour was not available either Carl Bielenberg, Livinous Manyanga or the author (all experienced ram press operators) worked the presses.

30. All the pre-processing practices as normally adopted by the press owners were used prior to press testing.

31. Appendix I contains report sheets for each ram press including observations on the operation.

32. Appendix II is a summary table of the presses tested and contains the following information: press type; ambient temperature; temperature of seed into the ram press; moisture and oil contents of both seed and cake; amount processed during the test; number of strokes per minute; process time; amount processed per hour; weight of crude oil and cake; extrapolated figures for the volume of both crude and clarified oil obtained per 50 Kg bag of seed; percentage crude oil extraction efficiency based on measured yield of oil; and the total number of bags processed using the unit, based on replies from press owners.
33. Moisture content determinations (oven method) and oil content determinations (Newport Quantity Analyser; checked by reference to Soxhlet extraction) were carried out on seed and cake samples on return to UK. Appendix II contains the results.

34. Sediment trials were carried out at ambient temperature (24°C) in the VOPP offices in Arusha and were measured by volume after standing for between 3 and 7 days. These figures are contained in the individual report sheets (Appendix I).

35. The following account has included observations on the mechanical components of the presses and their performance; but it is important to note that Carl Bielenberg (ATI engineer), who was specifically employed to report on these aspects, has prepared a detailed report.

**Nand Singh Presses**

36. Four examples of the large ram press introduced in Tanzania in 1985 (Nand Singh type) were visited, all in the Babati area. The owners were: Mrs Mataya (farmer) Mwikantsi village; Mr Kaisa (extension worker) Mamire village; Mr Kweka (council worker) Babati town; and Mr Kilinga (medical officer) Babati town.

37. The press owned by Mr Kweka had processed 1600 bags of 50 Kg (80 tonnes) since he purchased it new in 1985. Several repairs had been carried out in local workshops over the years (outlined in visit report, Appendix I). This was the oldest press tested and the fact that it is still being used demonstrates its robust nature even after several repairs.

38. The Nand Singh presses are, however, arduous to operate, requiring two operators but owners benefit from high seed throughputs. The press owned by Mr Kaisa was only being operated by one labourer who was not employing a full handle stroke. His stroke rate was high (24 per minute) compared with the range for the other three of 8-14 per minute. This was reflected in the poor oil yield (6.8 litres) per bag compared with the range of 11.9-16.1 litres per bag recorded for the other three presses. For this reason the Kaisa press was not included when calculating the mean yields for the Nand Singh presses (Appendix II).

39. Nand Singh press owners were satisfied with their presses even though arduous to use. All those visited employed hired labourers to carry out the pressing and reported no shortage of applicants. The Nand Singh press is no longer manufactured in Tanzania having been superseded by the CAPU and CAMARTEC versions.

40. The following average figures were recorded for the Nand Singh presses visited (excluding that of Kaisa):
Amount of sunflower seed processed per hour: 15.6Kg
% oil content of seed : 48.6%
% residual oil content of cake : 27.9%
Volume (litres crude oil/50 Kg bag seed) : 14.5
% oil extraction efficiency (crude oil) : 58.5%

CAPU presses

41. Five of the intermediate size version introduced in about 1989 (CAPU type) were tested. The presses belonged to the following: Mrs Machibula, Kondoa town; VOPP - not yet sold -, Kondoa town; Mr Isere, Mrijo Juu village; Jaribu women's group, Mrijo Juu village; and CAMARTEC in Arusha.

42. The press most intensively operated in this group was that of Mrs Machibula of Kondoa who used it on the balcony of her apartment. Mrs Machibula indicated that this press had processed 300 bags of 50 Kg (15 tonnes) since 1990. Mrs Machibula had shortened the handle of the press to stop it hitting a projection over the balcony. She said she found no difficulty in operating the press herself but often used labourers. She buys seed and sells the processed oil. She was pleased with the press performance and considered it a useful source of income.

43. All owners liked the CAPU presses. Mr Isere had purchased a CAMARTEC press but had decided to replace it with a CAPU type as he found the throughput too slow.

44. The following average figures were recorded for the CAPU presses visited:

Amount of sunflower seed processed per hour: 11.9Kg
% oil content of seed : 47.6%
% residual oil content of cake : 24.3%
Volume (litres crude oil/50 Kg bag seed) : 14.4
% oil extraction efficiency (crude oil) : 59.0%

CAMARTEC presses

45. Five CAMARTEC presses were visited and four tested. That belonging to Mr Ali of Mrijo Chini was observed and samples taken from a run carried out (but not observed by the author) that afternoon. The other presses belonged to the following: Mr Sule, Kondoa town; Mrs Msaya, Kondoa town; Mrs Nduka, Mrijo Juu; and CAMARTEC in Arusha. This latter press was a modified, strengthened press manufactured (during the author's visit) at the request of Carl Bielenberg by CAMARTEC staff according to a design by Erwin Protzen.

46. A common complaint among CAMARTEC press owners was that the piston tended to jam and that parts were wearing quickly. Carl Bielenberg observed that the swivel pins and tie bars were showing excessive signs of wear after
reported short operating times. Appendix III contains a photograph of this effect. None of the presses visited had processed more than 60 bags (3 tonnes - Mrs Nduka). Others were reported as having processed only 2 bags (Sule and Msaya). All these presses showed signs of wear. That of Mr Ali was in very good condition (15 bags processed) and had been recently cleaned with water when inspected. Mr Ali considered that over-zealous operation to maximise yield and not cleaning the press after use were the reasons for undue wear.

47. Mr Sule and Mrs Nduka appeared satisfied with their presses, as did Mr Ali. Mrs Msaya had found that a nearby small expeller operation (MRN APV VII expeller) would process a 50-60 kg bag of sunflower seed and return 20 litres of oil to the customer for a charge of Tsh 1,000. She preferred to do this rather than process the seed on the ram press. The existence of local expeller operations could have an influence on the uptake of ram presses in certain areas. This fact is recognised by VOPP staff who are attempting to monitor expeller placements. The impact of such expeller operations could be very wide; one sunflower grower in Mrijo was reported to take sunflower seed to the Kondoa expeller, a journey time of over two hours.

48. The following average figures were recorded for the CAMARTEC presses visited:

| Amount of sunflower seed processed per hour: | 7.9Kg |
| % oil content of seed                  | 48.3% |
| % residual oil content of cake         | 22.7% |
| Volume (litres crude oil/50 Kg bag seed) | 15.9 |
| % oil extraction efficiency (crude oil) | 64.4% |

49. The following average figures were recorded for the modified, reinforced CAMARTEC press:

| Amount of sunflower seed processed per hour: | 7.1Kg |
| % oil content of seed                  | 48.2% |
| % residual oil content of cake         | 21.5% |
| Volume (litres crude oil/50 Kg bag seed) | 15.5 |
| % oil extraction efficiency (crude oil) | 61.6% |

The figures for the strengthened press are very similar to the figures for the original CAMARTEC model.

50. The author recommends that three strengthened presses be tested thoroughly and monitored regularly over a three-month period during the sunflower harvesting season at three separate sites in Tanzania. This testing is considered essential in order to assess the robustness of the CAMARTEC press.

COMPARISON OF THE THREE PRESS TYPES

51. The throughput range for sunflower seed on the Nand Singh press is the highest of the three press types with
a range of 10.3 - 18.8 Kg/hour and a mean of 15.6 Kg/hour. The CAPU press has a throughput range for sunflower seed of 7.1 - 25.0 Kg/hour with a mean of 11.9 Kg/hour. The CAMARTEC press has a throughput range for sunflower seed of 5.3 - 14.3 Kg/hour with a mean of 7.9 Kg/hour.

52. The amount of crude sunflower seed oil extracted per bag of 50 Kg seed was found to be highest in the CAMARTEC press (range 13.7 - 17.8 litres) with a mean of 15.9 litres. The figures for both the Nand Singh presses and the CAPU presses were similar with means of 14.5 and 14.4 litres respectively. The range for the CAPU press was 11.3 - 17.5 while that of the Nand Singh was 12.9 - 17.4 litres.

53. The presses are progressively more arduous to operate as they increase in size. The Nand Singh presses require two operators, both the CAPU and the CAMARTEC require one operator although it is easier to operate the latter press. Photographs of the three press types are contained in Appendix III.

54. Both the CAPU and CAMARTEC presses allow two levels of throughput to be covered while giving a good yield of oil per 50 Kg seed. There is scope therefore for both press types to be offered for sale (although the CAMARTEC press life expectancy needs to be determined - see paragraph 50).

FINANCIAL VIABILITY

55. Appendix IV contains simple financial calculations for the two press types based on figures observed during this visit. The assumed price for a modified CAMARTEC press is assumed to be Tsh 50,000 and that of a CAPU press Tsh 120,000. Both presses have payback periods of much less than one year and the operations are comparatively insensitive to press price.

56. Seed throughput and oil yield are the two main factors affecting viability. Both presses have advantages on each of these factors (CAPU for higher throughput - and long press life - and CAMARTEC for higher yield).

57. There exists the possibility of a farmer purchasing two CAMARTEC presses at a price cheaper than that estimated for a CAPU press and thereby surpassing the throughput (and oil yield) and the net income of the CAPU press. The extra cost incurred would be for two operators instead of one. A calculation for this possibility is also included in Appendix IV. It can be seen that running two CAMARTEC presses provides a greater net income than running one CAPU press (Tsh 441,240 compared with Tsh 305,739). An added benefit would be that if one press is ever required for repair the other would still be available for pressing.
58. The possibility of increasing returns when operating two CAMARTEC presses instead of one CAPU press reinforces the case for stringent testing of the CAMARTEC press prior to promotion by VOPP.

CREDIT LINES

59. VOPP have been operating their own credit scheme for press purchase in the past. Many press owners have benefited from the scheme. The VOPP credit scheme has been beneficial to potential press owners since institutional loans are generally not available at this level in Tanzania without collateral and a firm business plan.

60. However for the long term sustainability of the project institutional alternatives for credit extension should be investigated. A possibility is the extension of credit such as a hire-purchase scheme operated through a network of press suppliers located in strategic areas in Tanzania.

SUNFLOWER SEED TYPE

61. All press operators questioned during the visit said they processed a soft-shelled, small, mostly black sunflower seed. "Record" variety was the response given when asked to identify it by most operators. Those that did not know the name of the seed identified it as similar to a sample of "Record" shown to them by the author. One owner (Mrs Nduka) said she had tried a hard-shelled variety once but it was hard work and no oil was extracted.

PREPROCESSING PRIOR TO PRESSING

62. Most press operators winnow the sunflower seed, pick out foreign matter and spread in the sun before pressing. Some operators (especially those that buy seed rather than processing their own) assume that the seed is clean and process it immediately even without sun-heating. A pair of operators (see Kilinga and Kweka in Appendix I) routinely add a small quantity of water to the seed prior to pressing without sun heating.

PRESSING PRACTICES ADOPTED

63. Generally the faster the handle stroke rate the operator uses when operating the press the faster the throughput but at the expense of yield. The position of the pressure cone also affects yield. The tighter the pressure cone, the more back pressure is exerted and the higher the oil yield. (Appendix V contains the results of experiments carried out at the CAMARTEC workshop to demonstrate this effect - described in paragraph 69). However it is harder to operate the press using a tight pressure cone.
A compromise between stroke rate and pressure cone position is therefore reached by the operator to suit his/her preference. Press operators running custom milling operations are paid according to the quantity of seed processed. Assuming the customer is satisfied with the amount of oil received in return, the operator will increase the throughput as fast as possible. On the other hand, if the operator is selling the oil (a high-value commodity) it makes sense to maximise the oil yield. Under this operating regime, the amount of oil produced per bag becomes a prime consideration.

Press owners practising these extremes of operation were observed during the visit but most were adopting a compromise.

Often owners of CAMARTEC presses were using undue pressure when operating the press. This could be a legacy of the two preceding press models which were much harder to operate. The Nand Singh press requires two operators using all their strength. The CAPU requires one operator also using all his strength. The CAMARTEC press is relatively easy to operate and does not normally require all the strength of the operator to obtain good oil yields. However, if a press owner has seen the Nand Singh or CAPU presses in operation, there may be a tendency copy the observed amount of work when using a CAMARTEC press. Such extremes of force when operating the press could be a reason for the rapid wear encountered on some CAMARTEC presses. Training procedures should be reinforced on preferred operational practice.

OIL CLARIFICATION

Most of the press owners visited clarify crude sunflower oil by adding water in varying quantities and boiling the mixture for varying times. After boiling the oil is strained through a sieve to remove solid particles. Only one press owner routinely allows oil and seed particles to separate by gravity (Mrs Machibula). The common reason given for adding water and boiling is that clarification is quicker.

This confirms the results obtained by the author when carrying out settling trials of crude oils. Most of the oils collected were still cloudy after allowing to stand for 7 days at 24°C. The author has noted that soft-shelled, high oil content sunflower seed can often produce oils which remain cloudy on standing. This can be due to phosphatides and waxes present in the seed. In commercial processing sunflower seed oil is often clarified by degumming and winterization.

Appendix VI describes a typical method for oil clarification and contains details of a test carried out by the author which indicates the recovery of clarified
oil from crude sunflower seed oil. This figure was found to be 92.6% and is used to calculate clarified oil yields in the financial calculations contained in Appendix IV.

EXPERIMENTS CARRIED OUT AT CAMARTEC

Effect of handle stroke rate on throughput and oil yield

70. A series of experiments was carried out by the author at the CAMARTEC workshop to test the effect of handle stroke rate on throughput and crude oil yield when processing sunflower seed in a CAPU press. The results are given in Appendix V. Stroke rates of 12, 20 and 28 per minute were carried out while keeping the choke gap constant (40 mm). The temperature of the seed into the press was between 42 and 46°C for each test. The amount of oil yielded per 2.5 Kg charge decreased from 716 grams (stroke rate 12), through 594 grams (stroke rate 20) to 501 grams (stroke rate 28). Sunflower seed throughputs (Kg/hr) were 7.1, 10.7 and 15.0 respectively. The choke gap was adjusted to 32mm and the stroke rate increased to 44 strokes per minute giving figures of yield and throughput of 555 grams and 18.8 Kg/hr respectively. These experiments demonstrate the effect of the balance between yield and throughput that can be achieved by varying the stroke rate and the choke gap. A stroke rate of 44 per minute would not be practicable for more than a few minutes. A stroke rate of between 12 and 20 is more realistic.

Effect on oil yield of widening the cage gaps

71. Experiments were carried out to assess the effect on oil yield of widening CAPU ram press cage gaps. Two sets of experiments were carried out using both sunflower seed and sesame seed. The experiments are summarised in Appendix II. The gaps before widening varied between 0 and 0.3 mm. After cutting with a hacksaw blade the gaps were a constant 0.8 mm throughout the cage.

72. With sunflower seed, 12.7 litres of crude oil per 50 Kg bag were extracted at a stroke rate of 8 per minute and a throughput of 9.4 Kg/hr. Equivalent figures obtained after widening the gaps were 13.8 litres of oil (stroke rate 6 per minute) at a throughput of 9.1 Kg/hr. The temperature of the seed in the former was 43°C and that of the latter 32°C. It would seem likely that widening the gage gaps is beneficial with sunflower seed although these results must be interpreted with caution since it was difficult to duplicate exactly the choke gap owing to the inherent coarse adjustment control. The order of experiments was as follows:

1st Sunflower seed before widening gaps;
2nd Sesame seed before widening gaps;
3rd Sesame seed after widening gaps;
4th Sunflower seed after widening gaps.
The choke settings needed to be changed when processing the two different seeds in order to optimise processing conditions. The cage had to be removed from the press for widening in the workshop. The sequence of experiments described above allowed the choke setting to remain constant when processing sesame seed but not for sunflower seed.

73. The experiment was repeated with sesame seed. As can be seen in Appendix II there was insignificant difference in throughput and oil yield as a result of widening the cage gaps. Yield of oil was around 17 litres of oil per 50 Kg bag at a throughput of around 7 Kg per hour using a stroke rate of 4 per minute.

Ram pressing sesame seed and groundnut kernels and the effect of heating method on oil yield

74. Appendix II contains the summary of experiments to test the throughput and yield of groundnuts and sesame using both a CAPU and a (strengthened) CAMARTEC press. Paragraph 72 details throughput and yield of oil from sesame seed in a CAPU press.

75. Sesame seed was heated using two methods: sun heating and heating over a boiling water bath for 30 minutes prior to pressing. Seed temperatures obtained were 38°C and between 47 and 60°C respectively for the two methods. 18.8 litres of oil per 50 Kg bag at a throughput of 4.0 Kg per hour (stroke rate 4/min) was obtained after sun heating compared to 22 litres at a throughput of 4.4 Kg per hour after heating on a water bath. The stroke rate during the latter was also 4/min. This experiment shows the beneficial effect of temperature on oil yield.

76. The experiment was repeated using groundnut kernels. Figures obtained after sun heating (temperature of seed 40°C) were 14.1 litres crude oil per 50 Kg bag at a throughput of 5.4 Kg per hour (stroke rate 7/min). Equivalent figures after heating over a boiling water bath to a seed temperature of 65°C were 16.3 litres of oil per 50 Kg bag at a throughput of 5.4 Kg per hour at a stroke rate of 8/min. The beneficial effect of seed heating is again demonstrated.

77. The author recommends that a comprehensive field trial be undertaken using the two press types to determine the performance and financial viability of processing sesame seed and groundnut kernels. The high yield of oil from sesame seed using the CAMARTEC press is worthy of further investigation. There is potential for the uptake of the press for processing both these crops - not only in Tanzania but in other African countries.

78. Heating seed over a water bath is cumbersome and requires much fuel. However seed can reach a high temperature (a sunflower seed temperature of 52°C was recorded during sun heating in Kondoa) especially if it
is heated on a metal surface. It is recommended that VOPP instruct press operators to spread seed onto metal surfaces (in metal pans or on galvanised roofing sheet if available) and place in direct sunlight to maximise oil yields from seeds when using the ram press.

**RAM PRESS OPERATORS' MANUAL**

79. A ram press operating manual prepared by Lynn Schlueter to give guidance to ram press owners and operators was reviewed. Several of the suggestions made have been included in a revised version.

**RECOMMENDATIONS**

80. It is recommended that three strengthened CAMARTEC presses be tested thoroughly and monitored regularly over a three month period during the sunflower harvesting season at three separate sites in Tanzania. This testing is considered essential in order to assess the robustness of the CAMARTEC press (see paragraphs 6 and 50). It would be prudent to monitor more closely the performance of the CAMARTEC press and to then promote its wider application, but not to the exclusion of the CAPU press.

81. VOPP has offered a credit scheme to press purchasers in the past but to ensure a sustainable project, it is recommended that institutionalised systems for credit extension for ram press purchase be investigated (see paragraph 60).

82. It is recommended that a comprehensive field trial be undertaken using the two press types to determine the performance and financial viability of processing sesame seed and groundnut kernels. The high yield of oil from sesame seed using the CAMARTEC press is worthy of further investigation. There is potential for user uptake of the press for processing both these crops not only in Tanzania but in other African countries (see paragraphs 12 and 77).

83. Often owners of CAMARTEC presses were using undue pressure when operating the press. This could be a legacy of the two preceding press models which were much harder to operate. The Nand Singh press requires two operators using all their strength. The CAPU requires one operator also using all his strength. The CAMARTEC press is relatively easy to operate and does not normally require all the strength of the operator to obtain good oil yields. It is recommended that training procedures are reinforced by VOPP staff on preferred operational practice (see paragraph 66).

84. It is recommended that VOPP instruct press operators to spread seed onto metal surfaces (in metal pans or on galvanised roofing sheet if available) and place in direct sunlight to maximise oil yields from seeds when using the ram press (see paragraph 78).
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC  Date of purchase: 8/8/92  Date: 16/2/93
Owner: SULE  Occupation: Govt worker

Village: KONDOA  Condition: Excellent  Bought new: YES

Press payment scheme: CASH: 25,000/-  Monthly payments?:

Seed type: Sunflower  Record
Only one seed?: YES  Clean?: YES

No. seasons owned: ONE
Amount processed per season: 2 bags
Amount processed since owned: 2 bags

Any breakdowns?: NO  Nature?: Cost:

Distance to repair shop: 1 Km  Delay to repair?:

Ambient T: 25-30C  Weather: Sunny with slight misty cloud

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 33-35C

Seed cost: TSh 3500 - 4000

Weight of seed processed: 5 Kg

Start time: 11.15
Finish time: 11.36
Time for processing: 21 minutes

No strokes per minute: 28
No. of operators?: 1  Gender: M

Who supplies labour?: Owner  Payment for labour:

Wt cake (g) 3692  Wt Oil (g): 1265

Fate of oil: Home use / sold  Use of cake: Sold to cattle farmers
Price: 400/- per litre  Price: 600/- per bag (40kg)

Analysis of seed and products

Settling time and sediment: 8.1% by vol; still slightly cloudy after 7 days
Moisture content of seed: 5.60%  Moisture content of cake: 7.70%
Oil content of seed: 48.3% mfb  Oil content of cake: 26.3% mfb
Oil extraction efficiency of press: 55.5% based on crude oil yield.

Comments:
Mr Sule is satisfied with the press. Plans to plant 2 Ha sunflower seed for the press.
Sometimes women use the press but only to produce about 1.5 litres; then they get tired. He estimates he made TSh 2000 processing 2 bags of seed to get 20 litres of oil.
He boils the crude oil with water (2:1 oil to water) then strains.
He does not allow to settle - it takes too long.
RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC
2nd experiment, tighter choke, slower stroke speed

Date of purchase: 8/8/92

Owner: SULE
Occupation: Govt worker

Village: KONDOA
Condition: Excellent

Bought new YES

Press payment scheme: CASH: 25,000/-

Monthly payments?:

Seed type: Sunflower

Only one seed?: YES
Clean?: YES

No. seasons owned: ONE

Amount processed per season: 2 bags

Amount processed since owned: 2 bags

Any breakdowns?: NO
Nature?:

Cost:

Distance to repair shop: 1 Km

Delay to repair?:

Ambient T: 25-30C

Weather: Sunny with slight misty cloud

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 33-35C

Seed cost: TSh 3500 - 4000

Weight of seed processed: 2.5 Kg

Start time: >

Time for processing: 24 minutes

Finish time: >

No strokes per minute: 15

No. of operators?: 1

Gender: M

Who supplies labour?: Owner

Payment for labour:

Wt cake (g) -

Wt Oil (g): 1558

Fate of oil: Home use / sold
Use of cake: Sold to cattle farmers

Price: 400/- per litre
Price: 600/- per bag (40kg)

Analysis of seed and products

Settling time and sediment: 8.1% by vol; still slightly cloudy after 7 days

Moisture content of seed: 5.60%
Moisture content of cake: 7.80%

Oil content of seed: 48.3% mfb
Oil content of cake: 20.8% mfb

Oil extraction efficiency of press: 68.3% based on crude oil yield.

Comments:
Mr Sule is satisfied with the press. Plans to plant 2 Ha sunflower seed for the press.
Sometimes women use the press but only to produce about 1.5 litres; then they get tired. He estimates he made TSh 2000 processing 2 bags of seed to get 20 litres of oil.
He boils the crude oil with water (2:1 oil to water) then strains.
He does not allow to settle - it takes too long.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC  Date of purchase: Aug-92  Date: 17/2/93  Owner: Ali
Occupation: DES

Village: MRIJO JUU  Condition: Good  Bought new YES
No experiment carried out but samples taken
Press payment scheme: CASH, 25000/-  Monthly payments?:

Seed type: Sunflower  Only one seed?: YES  Record
Record

No. seasons owned:
Amount processed per season: 15 bags
Amount processed since owned: 15 bags

Any breakdowns?: Nature?: See below  Cost:

Distance to repair shop: 1 Km  Delay to repair?:
Ambient T: 30C  Weather: Sunny, few clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press:
Seed cost:
Weight of seed processed:
Start time: Time for processing:
Finish time: >
No strokes per minute: No. of operators?:
Who supplies labour?: Labourers  Payment for labour:
Wt cake (g)  Wt Oil (g):
Fate of oil: Own use  Use of cake: Own livestock
Price: Price:

Analysis of seed and products
Settling time and sediment: 9.1% by vol; clear after 7 days
Moisture content of seed: 6.50%  Moisture content of cake: 7.80%
Oil content of seed: 43.6% mfb  Oil content of cake: 25.4% mfb
Oil extraction efficiency of press: Not calculated (no experiment carried out)

Comments:
Piston jammed on this press. SIDO in Dodoma polished with emery paper.
Mr Ali thinks piston jamming is caused by excessive force when using the press and failure to clean it after use. The piston has not jammed since.
This press was in good condition and had been well maintained.
Samples of seed, cake and oil were taken from a run carried out that afternoon.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC
Date of purchase: Jul-92
Owner: Msaya
Occupation: Nurse

Village: KONDOA
Condition: "about half used"
Bought new: YES

Press payment scheme:
Press payment scheme: CASH: 25,000/-
Monthly payments?:

Seed type: Sunflower
Only one seed?: YES
Clean?: YES

No. seasons owned:
ONE

Amount processed per season:
2 bags

Any breakdowns?: NO
Nature?: Cost:

Distance to repair shop:
1 Km
Delay to repair?:

Ambient T:
30C
Weather: Sunny with slight misty cloud

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press:
40C

Seed cost:
TSh 3000

Weight of seed processed:
5 Kg

Start time:
2.05
> Time for processing: 57 minutes
Finish time:
3.02

No strokes per minute:
15
No. of operators?: 1
Gender: 4 X M

Who supplies labour?: Owner + labourer
Payment for labour: 200/- per bag

Wt cake (g): 3204
Wt Oil (g): 1648

Fate of oil: Home use / sold
Use of cake: Fed to own cattle
Price: 400/- per litre
Price: estimated: 600/- per bag (40kg)

Analysis of seed and products
Settling time and sediment:
10.3% by vol; still slightly cloudy after 7 days
Moisture content of seed:
4.90%
Moisture content of cake:
7.40%
Oil content of seed:
48.4% mfb
Oil content of cake:
18.9% mfb
Oil extraction efficiency of press:
71.6% based on crude oil yield.

Comments:
There is a MRN APV VII expeller nearby. They charge 1000/- to process a bag of seed.
Yield is 20 litres crude oil. Msaya only gets 2000/- per bag profit after paying labourer on the ram press.
Mixes cake 1:1 with maize bran
She boils the 5 litres crude oil with 2.5 litres water and salt (1 dessertspoon) then strains.
Settling produces a bad smell after about 3 days.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC
Date of purchase: Aug-92
Date: 17/2/93
Owner: Nduka
Occupation: Teacher

Village: MRIJO JUU
Condition: "half used"
Bought new YES

Press payment scheme: CASH, 25000/-
Monly payments?:

Seed type: Sunflower
Only one seed?: YES
Clean?: YES

Record
No. seasons owned: 
Amount processed per season: 
Amount processed since owned: 60 bags

Any breakdowns?: Nature?: See below
Cost: 800/-

Distance to repair shop: 6 Km
Delay to repair?:

Ambient T: 30C
Weather: Sunny, few clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 33C

Seed cost: TSh 3000

Weight of seed processed: 2.5 Kg

Start time: 4.35
Finish time: 5.01
> Time for processing: 26 minutes
No strokes per minute: 12
No. of operators?: 1
Gender: M

Who supplies labour?: Labourers
Payment for labour: 70/- per tin seed

Wt cake (g) 1763
Wt Oil (g): 709

Fate of oil: Own use, some sold
Use of cake: Customer keeps
Price: 525/- per litre

Analysis of seed and products
Settling time and sediment: 8.0% by vol; still cloudy after 7 days
Moisture content of seed: 5.30% Moisture content of cake: 7.10%
Oil content of seed: 48.0% mfb Oil content of cake: 25.0% mfb
Oil extraction efficiency of press: 62.3% based on crude oil yield.

Comments:
Piston jamming on this press. Carl Bielenberg removed and filed piston.
Tried press herself for a few hours. Hard work so hired local boys.
Welded at seed inlet. Piston jams. Poured hot water on to free it
Tried a tin of hard-shelled seed. No oil produced; very hard work. Never tried since.
RAM PRESS REVIEW: TANZANIA

Press Type: CAPU  Date of purchase: 1990
Owner: Machibula
Occupation: Housewife

Village: KONDOA  Condition: "about 2/3 used"
Bought new  YES

Press payment scheme: CASH: 60,000/-
Monthly payments?:

Seed type: Sunflower Record
Only one seed?: YES  Clean?: YES

No. seasons owned: THREE
Amount processed per season: About 300 bags
Amount processed since owned: About 300 bags

Any breakdowns?: YES: see below  Nature?: Cage, handle, foot  Cost: 60,000/-

Distance to repair shop: 0.5 Km  Delay to repair?: 2 hours
Ambient T: 30C  Weather: Sunny with slight misty cloud

Temperature of seed into press: 62-86C
Seed cost: TSh 3000 -4000

Weight of seed processed: 5 Kg

Start time:  >
Time for processing: 42 minutes
Finish time:  >

No strokes per minute: 15  No. of operators?: 1 at a time  Gender: 4 XM

Who supplies labour?: Owner + labourers  Payment for labour: 200/- per bag

Wt cake (g) 3308  Wt Oil (g): 1617

Fate of oil: Sold  Use of cake: Sold to cattle farmers
Price: 400/- per litre  Price: 600/- per bag (40kg)
8000/- per 18 kg tin

Analysis of seed and products
Settling time and sediment: 11.8% by vol; clear after 7 days
Moisture content of seed: 4.80%  Moisture content of cake: 6.60%
Oil content of seed: 47.0% mfb  Oil content of cake: 18.1% mfb
Oil extraction efficiency of press: 72.3% based on crude oil yield.

Comments:
Cage bulged: hammered back. Cracked foot welded. Handle reduced to 1.4 metres. Press on balcony in apartment block. Estimates 16-21 litres per 60 Kg bag seed.
One week processed 30 bags working in shifts day and night.
Oil left to settle 2 days. Mrs Machibula uses this press herself sometimes.
She loves the press "as much as my husband".
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAPU  Date of purchase: Nov-92  Date: 17/2/93
Owner: Isere  Occupation: Teacher

Village: MRIJO JUU  Condition: "very good"  Bought new YES

Press payment scheme: CASH: 60,000/-  Monthly payments?:

Seed type: Sunflower  Only one seed?: YES  Clean?: YES
Record

No. seasons owned: Amount processed per season: Amount processed since owned: 5 bags

Any breakdowns?: Bolt & pressure bolt  Nature?: Replaced  Cost:
Distance to repair shop: Delay to repair?:

Ambient T: 30C  Weather: Sunny, no clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 40-49C

Seed cost: TSh 3000

Weight of seed processed: 5 Kg

Start time: 11.41  Time for processing: 19 minutes
Finish time: 12.00

No strokes per minute: 16  No. of operators?: 1  Gender: 3 X M

Who supplies labour?: Labourers  Payment for labour: 70/-/Korie tin seed

Wt cake (g) 3464  Wt Oil (g): 1464

Fate of oil: Sold  Use of cake: Own goats
Price: 525/- per litre  Price:

Analysis of seed and products
Settling time and sediment: 8.4% by vol; still cloudy after 7 days
Moisture content of seed: 5.50%  Moisture content of cake: 6.80%
Oil content of seed: 48.3% mfb  Oil content of cake: 23.2% mfb
Oil extraction efficiency of press: 64.1% based on crude oil yield.

Comments:

Large numbers of customers for service milling. (based on operation of another press: Jaribu Womens Grou Cake mixed with maize bran, calcium carbonate and salt. Fed to goats.
Likes the fact that press can be repaired.
Charges 200/- per Korie tin seed for pressing. Pays operators 70/- per tin seed pressed.
Prefers high throughput at expense of yield for custom milling operation.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Date: 17/2/93

Press Type: CAPU Date of purchase: Nov-92 Owner: Isere
2nd experiment with experienced operator Occupation: Teacher

Condition: "very good" Bought new YES

Village: MRIJO JUU

Press payment scheme: CASH: 60,000/- Montly payments?:

Seed type: Sunflower Only one seed?: YES
Record Clean?: YES

No. seasons owned:
Amount processed per season: 5 bags
Amount processed since owned: 5 bags

Any breakdowns?: Bolt & pressure bolt Nature?: Replaced Cost:

Distance to repair shop: Delay to repair?:

Ambient T: 30C Weather: Sunny, no clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 40-49C

Seed cost: TSh 3000

Weight of seed processed: 5 Kg

Start time: > > Time for processing: 12 minutes
Finish time: >

No strokes per minute: 16 No. of operators?: 1 Gender: M

Who supplies labour?: Labourers Payment for labour: 70/-/Korie tin seed

Wt cake (g) - Wt Oil (g): 1048

Fate of oil: Sold Use of cake: Own goats
Price: 525/- per litre Price:

Analysis of seed and products

Settling time and sediment: 7.2% by vol; still cloudy after 7 days
Moisture content of seed: 5.30% Moisture content of cake: 6.70%
Oil content of seed: 48.5% mfb Oil content of cake: 27.4% mfb
Oil extraction efficiency of press: 45.6% based on crude oil yield.

Comments:

Large numbers of customers for service milling. (based on operation of another press: Jaribu Womens Grou
Cake mixed with maize bran, calcium carbonate and salt. Fed to goats.
Likes the fact that press can be repaired.
Charges 200/- per Korie tin seed for pressing. Pays operators 70/- per tin seed pressed.
Prefers high throughput at expense of yield for custom milling operation.
**RAM PRESS REVIEW: TANZANIA**

Press Type: CAPU

Date of purchase: 1991

Date: 17/2/93

Owner: JARIBU

Occupation: Women's group

Bought new: YES

Village: MRIJO JUU

Condition: "nearly finished"

Press payment scheme: VOPP

Monthly payments?:

- 18000/- down
- 3 X 14000/- monthly

Seed type: Sunflower

Only one seed?: YES

Clean?: YES

No. seasons owned: TWO

Amount processed per season: 134 bags

Amount processed since owned: 134 bags

Any breakdowns?: YES

Nature?: See below

Cost: 15230/-

Distance to repair shop: 6 Km

Weather: Sunny, no clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 35-56C

Seed cost: TSh 3000

Weight of seed processed: 5 Kg

Start time: 12.23

> Time for processing: 45 minutes

Finish time: 1.10

No strokes per minute: 14

No. of operators?: 1

Gender: M

Who supplies labour?: Labourers

Payment for labour: 70/- /Korie tin seed

Wt cake (g) -

Wt Oil (g): 1048

Fate of oil: Sold

Use of cake: Own goats

Price: 525/- per litre

Price:

**Analysis of seed and products**

Settling time and sediment: 16.4% by vol; clear after 7 days

Moisture content of seed: 5.10%

Moisture content of cake: 6.50%

Oil content of seed: 48.1% mfb

Oil content of cake: 24.6% mfb

Oil extraction efficiency of press: 61.8% based on crude oil yield.

Comments:

Had a CAMARTEC press but it was binding. Some seed from this village goes to Kondoa for expelling.

Large numbers of customers for service milling.

Bolt replaced 3 times.

Side plate fracture rewelded. Wooden base bends and can crack.

Pin very worn: rewelded. Ram not entering cage therefore not enough pressure applied to seed.

Prefers high throughput at expense of yield for custom milling operation.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAPU
Date of purchase: Not yet sold
Owner: VOPP
Village: KONDOA
Condition: Brand new
Bought new?:
Press payment scheme: Montly payments?:
Seed type: Sunflower Record
Only one seed?: YES
Clean?: YES

No. seasons owned:
Amount processed per season:
Amount processed since owned:
Any breakdowns?:
Nature?:
Cost:
Distance to repair shop:
Delay to repair?:
Ambient T: 27-36C
Weather: Sunny with few clouds
Preprocessing?: Winnowed and picked over. Heated in sun.
Temperature of seed into press: 46C
Seed cost:
Weight of seed processed: 5 Kg
Start time: 11.45
> Time for processing: 27 minutes
Finish time: 12.12
No. of operators?: 1
Gender: M
Who supplies labour?:
Payment for labour:
Wt cake (g) 3735
Wt Oil (g): 1223
Fate of oil:
Use of cake:
Price:
Price:

Analysis of seed and products
Settling time and sediment: 9.0% by vol; still cloudy after 7 days
Moisture content of seed: 4.40% Moisture content of cake: 5.80%
Oil content of seed: 47.8% mfb Oil content of cake: 26.8% mfb
Oil extraction efficiency of press: 53.5% based on crude oil yield.

Comments:
The reinforcing ring on this press cage was poorly constructed. It was rewelded in a local workshop by Carl Bielenberg prior to the experiment.
This press was made by MUSUYE engineering in Dodoma.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAPU
Date of purchase: Not yet sold
Owner: VOPP
Date: 18/2/93
Occupation:

Second experiment at faster stroke rate.

Village: KONDOA
Condition: Brand new
Bought new?:

Press payment scheme: Monthly payments?:

Seed type: Sunflower
Record
Only one seed?: YES
Clean?: YES

No. seasons owned:
Amount processed per season:
Amount processed since owned:

Any breakdowns?: Nature?: Cost:

Distance to repair shop: Delay to repair?:
Ambient T: 27-36C Weather: Sunny with few clouds
Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 52C
Seed cost:
Weight of seed processed: 2 Kg
Start time: 12.36
> Time for processing: 11 minutes
Finish time: 12.47
> No. of operators?: 1
No strokes per minute: 10
Gender: M
Who supplies labour?: Payment for labour:

Wt cake (g) 1415 Wt Oil (g): 582
Fate of oil:
Use of cake:
Price:

Analysis of seed and products
Settling time and sediment: 9.0% by vol; still cloudy after 7 days
Moisture content of seed: 3.90% Moisture content of cake: 5.60%
Oil content of seed: 47.2% mfb Oil content of cake: 24.6% mfb
Oil extraction efficiency of press: 64.2% based on crude oil yield.

Comments:
The reinforcing ring on this press cage was poorly constructed. It was rewelded in a local workshop by Carl Bielenberg prior to the experiment.
This press was made by MUSUYE engineering in Dodoma.
Although the stroke rate was higher, the extraction efficiency was higher. The choke may have been tighter during this run.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: NAND SINGH  Date: 24/2/93  Date of purchase: 1988  Owner: Kaisa  Occupation: Bwana shamba

Village: MAMIRE  Condition: 40% wear  Bought new YES

Press payment scheme: VOPP credit scheme  Monthly payments?:
150,000/-

Seed type: Sunflower record  Only one seed?:

No. seasons owned: Five  Nature?: See below  Cost: 18,000/-

Amount processed per season: 200 bags  Delay to repair?: No, immediate
Amount processed since owned: 1000+ bags

Any breakdowns?: YES  Ambient T: 23C

Distance to repair shop: Babati: 10 Km  Weather: Cloudy

Preprocessing?: No, assumes winnowed when purchased. NO sun heating

Temperature of seed into press: 22C

Seed cost: 3000-4000/- per bag  Only sun heats if seed long in store.

Weight of seed processed: 5 Kg  Temperature of seed into press:

Start time: 9.20 > Time for processing: 19 minutes

Finish time: 9.39 >

No strokes per minute: 24  No. of operators?: 1  Gender: M

Who supplies labour?: 1 labourer  Payment for labour: 700/- per 20 litres oil

Wt cake (g) 3175  Wt Oil (g): 632

Fate of oil: Customer takes Use of cake: Animals: mix with beer grain res
Price: oil sold at 7000/- per 20 litres  Price: 600/- per bag

Analysis of seed and products

Settling time and sediment: 10.0% by vol; still cloudy after 2 days
Moisture content of seed: 5.10%  Moisture content of cake: 8.90%
Oil content of seed: 49.0% mfb  Oil content of cake: 37.1% mfb
Oil extraction efficiency of press: 27.2% based on crude oil yield.

Comments:
Amount of cake suspect. Not all cake could be collected. This press relies on a build up of cake around the outlet to build pressure. It is difficult to remove cake to carry out a mass balance. Operator did not perform full stroke operation. Expt carried out indoors.
Clarifies oil by boiling with water (preferred: quicker) or leaves to settle.
Ram wore out; handle broke, cage distended; cylinder wore out. All fixed. Total cost: 18,000/-
Service press operation: 200/- per tin seed pressed. Customer leaves cake.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: NAND SINGH
Date of purchase: 1990
Owner: Kilinga
Occupation: Medical officer

Village: BABATI
Condition: 25% worn
Bought new

Press payment scheme: CASH: 150,000/-
Monthly payments?:

Seed type: Sunflower
Only one seed?: YES
Clean?:

No. seasons owned: 3
Amount processed per season: Unknown
Amount processed since owned: Unknown

Any breakdowns?: No
Nature?: Cost:

Distance to repair shop: Babati, 0.5 Km
Delay to repair?:

Ambient T: 33C
Weather: Sunny with a few clouds

Preprocessing?: Yes: adds small amount of water prior to pressing. No sun heating.

Temperature of seed into press: 35C

Seed cost: 3000-4500/- per bag

Weight of seed processed: 5 Kg

Start time: 12.52
> Time for processing: 21 minutes less 5 mins down time = 16
Finish time: 1.13

No strokes per minute: 8
No. of operators?: 2 together
Gender: 2 X M

Who supplies labour?: Labourers
Payment for labour: 1000/- per 20 litres oil
Shared

Wt cake (g) Not measured
Wt Oil (g): 1191

Fate of oil: Sold locally
Use of cake: Livestock
Price: oil sold at 7000/- per 20 litres

Price: 800/- per bag

Analysis of seed and products

Settling time and sediment: 10.0% by vol; still cloudy after 2 days
Moisture content of seed: 6.70%
Moisture content of cake: 7.50%
Oil content of seed: 48.4% mfb
Oil content of cake: 34.1% mfb
Oil extraction efficiency of press: 52.7% based on crude oil yield.

Comments:
Amount of cake not measured. Not all cake could be collected. This press relies on a build up of cake around the outlet to build pressure. It is difficult to remove cake to carry out a mass balance.
Clarification trial carried out: 1838g oil gave 1725g after addition of water and boiling. (=92.6% recovery)
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: NAND SINGH
Date of purchase: 1985

Date: 24/2/93
Owner: Kweka
Occupation: Council worker

Village: BABATI
Condition: Good

Bought new: YES

Press payment scheme: VOPP credit scheme
Monthly payments?: 3 instalments

25,000/-

Seed type: Sunflower record
Only one seed?: YES

Clean?:

No. seasons owned: Eight
Amount processed per season: 200 bags
Amount processed since owned: 1600 bags

Any breakdowns?: YES
Nature?: See below

Cost: 132,000/-

Distance to repair shop: Babati 0.5Km
Delay to repair?: No, immediate

Ambient T: 24C
Weather: Sunny with a few clouds

Temperature of seed into press: 26C

Preprocessing?: Yes: adds small amount of water prior to pressing. No sun heating.

Seed cost: 3000-4500/- per bag

Weight of seed processed: 5 Kg

Start time: 11.30
> Time for processing: 17 minutes

Finish time: 11.47

No strokes per minute: 14
No. of operators?: 2 together
Gender: 2 X M

Who supplies labour?: Labourers
Payment for labour: 1000/- per 20 litres oil
Shared

Wt cake (g) 3922
Wt Oil (g): 1216

Fate of oil: Sold locally
Use of cake: Livestock

Price: oil sold at 7000/- per 20 litres
Price: 800/- per bag

Analysis of seed and products

Settling time and sediment: 9.2% by vol; still cloudy after 2 days

Moisture content of seed: 6.70%
Moisture content of cake: 9.70%

Oil content of seed: 48.4% mfb
Oil content of cake: 26.5% mfb

Oil extraction efficiency of press: 53.8% based on crude oil yield.

Comments:
Amount of cake suspect. Not all cake could be collected. This press relies on a build up of cake around the outlet to build pressure. It is difficult to remove cake to carry out a mass balance. Piston replaced 5 times (25,000/-); Cage distended 4 times: new cage 25,000/-; handle broke 3 times (3,000/-); reinforced side plates (1000/-); cone worn twice 3,000/- TOTAL: 132,000/-
Expt carried out inside house.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: NAND SINGH  Date of purchase: 1990
Date: 23/2/63
Owner: Mataya
Occupation: Farmer

Village: MWIKANTSI  Condition: 40% wear
Bought new YES

Press payment scheme: CASH, 160,000/-
Monthly payments?:

Seed type: Sunflower record
Only one seed?:
Clean?: YES

No. seasons owned: Three
Amount processed per season: 180 bags
Amount processed since owned: 540 bags
Any breakdowns?: YES Nature?: See below Cost: 7000/-
Distance to repair shop: Babati, 15 Km  Delay to repair?: No, immediate
Ambient T: 33C Weather: Sunny
Preprocessing?: Winnowed and picked over. NO sun heating

Temperature of seed into press: 40C

Seed cost: 3500-4000/- per bag

Weight of seed processed: 5 Kg
Start time: 2.03 > Time for processing: 36 minutes - 7mins to undo choke= 29
Finish time: 2.39 >

No strokes per minute: 10  No. of operators?: 3 together Gender: 3 x M
Who supplies labour?: Labourers Payment for labour: 800/- per 20 litres oil
Payment shared

Wt cake (g) 2781 Wt Oil (g): 1605

Fate of oil: Home use, some sold Use of cake: Own livestock
Price: 750 ml= 300/- Price: Estimated @ 1000/- per bag
18 kg = 6,500/- Never sold

Analysis of seed and products
Settling time and sediment: 10.0% by vol; still cloudy after 3 days
Moisture content of seed: 5.10%  Moisture content of cake: 8.10%
Oil content of seed: 49.0% mfb  Oil content of cake: 23.0% mfb
Oil extraction efficiency of press: 69.1% based on crude oil yield.

Comments:
Amount of cake suspect. Not all cake could be collected. This press relies on a build up of cake around the outlet to build pressure. It is difficult to remove cake to carry out a mass balance. Lots of seed and foots expelled with oil. Mrs Mataya filters it. 15 litres oil mixed with 2.5 litres oil and boiled prior to use. Press difficult to adjust to steady state running. Side plates broke once: rewelded in Babati.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC
Ground nuts heated in the sun for 2 hours.

Village: 
Condition: Brand new

Press payment scheme: 
Monthly payments?:

Seed type: Groundnut kernels
Only one seed?: Clean?:

No. seasons owned:
Amount processed per season:
Amount processed since owned:

Any breakdowns?: Nature?: Cost:

Distance to repair shop: Delay to repair?:

Ambient T: 30°C
Weather: Sunny with light broken clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 40°C

Seed cost:
Weight of seed processed: 5 Kg

Start time: 3.51
Finish time: 4.47
> Time for processing: 56 minutes

No strokes per minute: 7
No. of operators?: 1
Gender: M

Who supplies labour?: Payment for labour:

Wt cake (g) 3591
Wt Oil (g): 1305

Fate of oil: Use of cake:

Price:

Analysis of seed and products
Settling time and sediment: 15.1% by vol; almost clear after 4 days
Moisture content of seed: 4.80%
Oil content of seed: 48.5% mfb
Oil extraction efficiency of press: 56.5% based on crude oil yield.

Comments:
Compare this run with groundnut kernels heated on water bath.
This run carried out with 30 mm ram.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC
Groundnuts heated in the sun for 3 hours.

Village: 
Condition: Brand new

Press payment scheme: 
Monthly payments?

Seed type: Groundnut
 kernels

Only one seed?: Clean?:

No. seasons owned:
Amount processed per season:
Amount processed since owned:

Any breakdowns?: Nature?: Cost:

Distance to repair shop:
Delay to repair?:

Ambient T: 30C
Weather: Sunny with light broken clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 32-38C

Seed cost:

Weight of seed processed: 5 Kg

Start time: 5.01
> Time for processing: 45 minutes
Finish time: 5.46

No strokes per minute: 6
No. of operators?: 1 Gender: M

Who supplies labour?: Payment for labour:

Wt cake (g) 3808 Wt Oil (g): 1117

Fate of oil:
Use of cake:

Price:

Analysis of seed and products
Settling time and sediment: 12.5% by vol; still cloudy after 4 days
Moisture content of seed: 4.60% Moisture content of cake: 5.90%
Oil content of seed: 48.5% mfb Oil content of cake: 33.8% mfb
Oil extraction efficiency of press: 48.3% based on crude oil yield.

Comments:
This run carried out with 40 mm ram.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC  Date of purchase: Not yet sold  Owner: CAMARTEC
Groundnuts heated on water bath for 30 minutes  Occupation:

Village:  Condition: Brand new  Bought new?:
Press payment scheme:  Monthly payments?:
Seed type: Groundnut kernels  Only one seed?:  Clean?:

No. seasons owned:
Amount processed per season:
Amount processed since owned:

Any breakdowns?:  Nature?:  Cost:
Distance to repair shop:  Delay to repair?:
Ambient T: 28°C  Weather: Sunny with light broken clouds
Preprocessing?: Winnowed and picked over. Heated over water bath.
Temperature of seed into press: 65°C

Seed cost:
Weight of seed processed: 5 Kg
Start time: 2.36  Time for processing: 56 minutes
Finish time: 3.32
No strokes per minute: 8  No. of operators?: 1  Gender: M
Who supplies labour?: Payment for labour:
Wt cake (g) 3036  Wt Oil (g): 1508
Fate of oil:  Use of cake:
Price:  Price:

Analysis of seed and products
Settling time and sediment: 13.1% by vol; almost clear after 4 days
Moisture content of seed: 4.70%  Moisture content of cake: 6.40%
Oil content of seed: 48.1% mfb  Oil content of cake: 24.6% mfb
Oil extraction efficiency of press: 65.8% based on crude oil yield.

Comments:
Compare this run with sun heated groundnut kernels.
This run carried out with 30 mm ram.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAPU  Date: 19/2/93  Owner: CAMARTEC
Expt carried out before cutting cage bars open

Date of purchase: Not yet sold  Occupation:

Owner: CAMARTEC

Village:  Condition: Good
Bought new?:

Press payment scheme: Monthly payments?:

Seed type: SESAME Only one seed?: Clean?:

No. seasons owned:
Amount processed per season:
Amount processed since owned:

Any breakdowns?: Nature?: Cost:

Distance to repair shop: Delay to repair?:

Ambient T: 28C  Weather: Sunny with few clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 40C

Seed cost:

Weight of seed processed: 2.5Kg

Start time: 2.25  >

> Time for processing: 22 minutes

Finish time: 2.47  >

No strokes per minute: 4  No. of operators?: 1  Gender: M

Who supplies labour?: Payment for labour:

Wt cake (g) 1671  Wt Oil (g): 792

Fate of oil:

Use of cake:

Price:

Price:

Analysis of seed and products

Settling time and sediment: 4.5% by vol; clear after 6 days

Moisture content of seed: 4.20% Moisture content of cake: 6.20%

Oil content of seed: 53.8% mfb Oil content of cake: 35.0% mfb

Oil extraction efficiency of press: 61.4% based on crude oil yield.

Comments:
This experiment carried out before cutting cage bars open with hacksaw to increase gaps
Compare with experiment after cutting cage.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAPU
Expt carried out after cutting cage bars open

Date: 19/2/93
Press Type: CAPU
Owner: CAMARTEC
Date of purchase: Not yet sold
Occupation:

Village: Condition: Good
Bought new?:

Press payment scheme: Monthly payments?:

Seed type: SESAME Only one seed?: Clean?:

No. seasons owned:
Amount processed per season:
Amount processed since owned:

Any breakdowns?: Nature?: Cost:

Distance to repair shop: Delay to repair?:
Ambient T: 28C Weather: Sunny with few clouds

Preprocessing?: Winnowed and picked over. Heated in sun.
Temperature of seed into press: 30C

Seed cost:

Weight of seed processed: 2.5Kg
Start time: 5.12 > Time for processing: 22 minutes
Finish time: 5.33 >
No strokes per minute: 4 No. of operators?: 1 Gender: M

Who supplies labour?: Payment for labour:
Wt cake (g) 1668 Wt Oil (g): 794

Fate of oil:
Price: Use of cake:

Analysis of seed and products
Settling time and sediment: 6.5% by vol; clear after 6 days
Moisture content of seed: 4.80% Moisture content of cake: 6.70%
Oil content of seed: 53.8% mfb Oil content of cake: 33.3% mfb
Oil extraction efficiency of press: 62.0% based on crude oil yield.

Comments:
This experiment carried out after cutting cage bars open with hacksaw to increase gaps
Compare with experiment before cutting cage.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

| Press Type: | CAPU | Date of purchase: | Not yet sold | Date: 19/2/93 |
| Occupation: | CAMARTEC | Owner: | Bough new?: |

Expt carried out before cutting cage bars open

Village: | Condition: Good

Press payment scheme: | Monthly payments?:

Seed type: Sunflower Record

Only one seed?: YES | Clean?: YES

No. seasons owned: | Amount processed per season: |

Amount processed since owned: | Any breakdowns?: | Nature?: | Cost: |

Distance to repair shop: | Delay to repair?: |

Ambient T: 30 | Weather: Sunny with few clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 43C

Seed cost:

Weight of seed processed: 5 Kg

Start time: 1.37 | > | Time for processing: 32 minutes

Finish time: 2.09 | >

No strokes per minute: 8 | No. of operators?: 1 | Gender: M

Who supplies labour?: Payment for labour:

Wt cake (g) 3818 | Wt Oil (g): 1178

Fate of oil: Use of cake: Price:

Price:

Analysis of seed and products

Settling time and sediment: 13.3% by vol; still cloudy after 6 days

Moisture content of seed: 5.00% | Moisture content of cake: 6.60%

Oil content of seed: 47.1% mfb | Oil content of cake: 25.5% mfb

Oil extraction efficiency of press: 52.7% based on crude oil yield.

Comments:

This experiment carried out before cutting cage bars open with hacksaw to increase gaps

Compare with experiment after cutting cage.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAPU  Date of purchase: Not yet sold  Owner: CAMARTEC
Expt carried out after cutting cage bars open  Occupation:

Village:  Condition: Good  Bought new?:

Press payment scheme:  Montly payments?:

Seed type: Sunflower Record  Only one seed?: YES  Clean?: YES

No. seasons owned:  Amount processed per season:
Amount processed since owned:

Any breakdowns?:  Nature?:

Distance to repair shop:  Delay to repair?:

Ambient T: 28C  Weather: Sunny with few clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 32C

Seed cost:

Weight of seed processed: 5 Kg

Start time: 5.47  >  Time for processing: 33 minutes
Finish time: 6.20  >

No strokes per minute: 6  No. of operators?: 1  Gender: M

Who supplies labour?:  Payment for labour:

Wt cake (g) 3691  Wt Oil (g): 1280

Fate of oil:

Price:

Analysis of seed and products

Settling time and sediment: 8.3% by vol; still cloudy after 6 days
Moisture content of seed: 5.50%  Moisture content of cake: 7.60%
Oil content of seed: 47.0% mfb  Oil content of cake: 24.5% mfb
Oil extraction efficiency of press: 57.7% based on crude oil yield.

Comments:
This experiment carried out after cutting cage bars open with hacksaw to increase gaps
Compare with experiment before cutting cage.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC  Date: 19/2/93
For comparison with heating in sun.

Owner: CAMARTEC

Date of purchase: Not yet sold

Village:
Condition: Good

Bought new?:

Press payment scheme: Monthly payments?:

Seed type: SESAME  Only one seed?: Clean?:
Heated in water bath for 30 minutes before pressing

No. seasons owned:
Amount processed per season:
Amount processed since owned:

Any breakdowns?: Nature?: Cost:

Distance to repair shop: Delay to repair?:

Ambient T: 29C  Weather: Sunny with few clouds

Preprocessing?: Winnowed and picked over. Heated over water bath.

Temperature of seed into press: 47-60C

Seed cost:

Weight of seed processed: 5 Kg

Start time: 11.50 > Time for processing: 75 minutes
Finish time: 1.05 >

No strokes per minute: 4  No. of operators?: 3  Gender: 2M+1F

Who supplies labour?: Payment for labour:

Wt cake (g) 2859 Wt Oil (g) 2033

Fate of oil: Use of cake:

Price:

Analysis of seed and products

Settling time and sediment: 8.4% by vol; clear after 6 days
Moisture content of seed: 4.10%  Moisture content of cake: 7.70%
Oil content of seed: 53.9% mfb  Oil content of cake: 26.0% mfb
Oil extraction efficiency of press: 78.8% based on crude oil yield.

Comments:
SESAME DRIED OVER WATER BATH (for comparison with sesame heated in sun)
NEWLY MADE REINFORCED CAMARTEC PRESS
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC  Date: 19/2/93
For comparison with heating over water bath  Owner: CAMARTEC
Village:  Occupation:
Press payment scheme:  Bought new?:
Seed type: SESAME  Clean?:

No. seasons owned:  Nature?:
Amount processed per season:  Cost:
Amount processed since owned:
Any breakdowns?:  Distance to repair shop:  Delay to repair?:
Press payment scheme:  Monthly payments?:

Seed type: SESAME  Clean?:

Seed cost:
Weight of seed processed: 4.5Kg
Start time: 3.10 >
> Time for processing: 62 minutes
Finish time: 4.12 >
No strokes per minute: 4  No. of operators?: 1  Gender: M
Who supplies labour?:
Payment for labour:

Wt cake (g) 2821  Wt Oil (g): 1568
Fate of oil: Use of cake:
Price:

Analysis of seed and products
Settling time and sediment: 9.0% by vol; clear after 6 days
Moisture content of seed: 5.00%  Moisture content of cake: 6.20%
Oil content of seed: 54.1% mfb  Oil content of cake: 29.8% mfb
Oil extraction efficiency of press: 67.8% based on crude oil yield.

Comments:
SUN-DRIED SESAME (for comparison with sesame heated on water bath)
NEWLY MADE REINFORCED CAMARTEC PRESS
### APPENDIX I

**RAM PRESS REVIEW: TANZANIA**

<table>
<thead>
<tr>
<th>Press Type: CAMARTEC</th>
<th>Date of purchase: Not yet sold</th>
<th>Date: 22/2/93</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 strokes per min</td>
<td>Owner: CAMARTEC</td>
<td></td>
</tr>
<tr>
<td>Village:</td>
<td>Condition: Brand new</td>
<td></td>
</tr>
<tr>
<td>Press payment scheme:</td>
<td>Bought new?:</td>
<td></td>
</tr>
<tr>
<td>Seed type: Sunflower</td>
<td>Only one seed?:</td>
<td></td>
</tr>
<tr>
<td>Record</td>
<td>Clean?:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. seasons owned:</th>
<th>Amount processed per season:</th>
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</thead>
<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>Any breakdowns?:</th>
<th>Nature?:</th>
<th>Cost:</th>
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</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Distance to repair shop:</th>
<th>Delay to repair?:</th>
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<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Ambient T: 30C</th>
<th>Weather: Sunny with light broken clouds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Preprocessing?:</th>
<th>Winnowed and picked over. Heated in sun.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature of seed into press:</th>
<th>46C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

| Seed cost: | |
|------------||
|            |     |

<table>
<thead>
<tr>
<th>Weight of seed processed:</th>
<th>2.5 Kg</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Start time: 11.29</th>
<th>Finish time: 11.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;</td>
<td>&gt;</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>No. of operators?:</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: M</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wt cake (g) 1767</th>
<th>Wt Oil (g) 716</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

| Fate of oil: Use of cake: Price: |
|----------------------------------|-----------------|----------|
|                                  |                 |          |

<table>
<thead>
<tr>
<th>Analysis of seed and products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settling time and sediment:</td>
</tr>
<tr>
<td>Moisture content of seed:</td>
</tr>
<tr>
<td>Oil content of seed:</td>
</tr>
<tr>
<td>Oil extraction efficiency of press:</td>
</tr>
</tbody>
</table>

| Comments: Ckoke setting 40 mm. | |
|---------------------------------|
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC
20 strokes per min

Date: 22/2/93
Date of purchase: Not yet sold
Owner: CAMARTEC
Condition: Brand new
Bought new?:

Village:

Seed type: Sunflower
Record

Occupation:

Press payment scheme:

Only one seed?:

No. seasons owned:

Condition: Brand new

Amount processed per season:

Bought new?:

Amount processed since owned:

Any breakdowns?:

Nature?:

Cost:

Distance to repair shop:

Delay to repair?:

Weather: Sunny with light broken clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 42C

Seed cost:

Weight of seed processed: 2.5 Kg

Start time: 12.04

> Time for processing: 14 minutes

Finish time: 12.18

> No. of operators?: 1

Gender: M

Who supplies labour?:

Payment for labour:

Wt cake (g) 1882

Wt Oil (g): 594

Fate of oil:

Use of cake:

Price:

Price:

Analysis of seed and products

Settling time and sediment: 18.6% by vol; still cloudy after 4 days

Moisture content of seed: 3.60% Moisture content of cake: 5.90%

Oil content of seed: 48.2% mfb Oil content of cake: 25.6% mfb

Oil extraction efficiency of press: 51.1% based on crude oil yield.

Comments:

Chole setting 40 mm.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC
28 strokes per min

Date: 22/2/93
Date of purchase: Not yet sold
Owner: CAMARTEC
Occupation:

Village:
Condition: Brand new
Bought new?:

Press payment scheme:
Montly payments?:

Seed type: Sunflower
Record

Only one seed?:
Clean?:

No. seasons owned:
Amount processed per season:
Amount processed since owned:

Any breakdowns?:
Nature?:
Cost:

Distance to repair shop:
Delay to repair?:

Ambient T: 30C
Weather: Sunny with light broken clouds

Preprocessing?: Winnowed and picked over. Heated in sun.

Temperature of seed into press: 44C

Seed cost:

Weight of seed processed: 2.5 Kg

Start time: 12.40
> Time for processing: 10 minutes
Finish time: 12.50

No strokes per minute: 28
No. of operators?: 1
Gender: M

Who supplies labour?:
Payment for labour:

Wt cake (g) 1976
Wt Oil (g): 501

Fate of oil:
Use of cake:
Price: 

Analysis of seed and products

Settling time and sediment: 14.7% by vol; still cloudy after 4 days
Moisture content of seed: 3.60%
Moisture content of cake: 5.40%
Oil content of seed: 48.2% mfb
Oil content of cake: 28.4% mfb
Oil extraction efficiency of press: 43.1% based on crude oil yield.

Comments:
Choke setting 40 mm.
APPENDIX I

RAM PRESS REVIEW: TANZANIA

Press Type: CAMARTEC
44 strokes per min

Date of purchase: Not yet sold
Owner: CAMARTEC
Occupation:

Village: Condition: Brand new
Bought new?:

Press payment scheme: Montly payments?:

Seed type: Sunflower
Record Only one seed?: Clean?:

No. seasons owned: Amount processed per season:
Amount processed since owned:

Any breakdowns?: Nature?: Cost:

Distance to repair shop: Delay to repair?:

Ambient T: 30C Weather: Sunny with light broken clouds

Preprocessing?: Winnowed and picked over. Heated in sun.
Temperature of seed into press: 44C

Seed cost:

Weight of seed processed: 2.5 Kg

Start time: 1.04 >
> Time for processing: 8 minutes
Finish time: 1.12 >

No strokes per minute: 44 No. of operators?: 1 Gender: M

Who supplies labour?: Payment for labour:

Wt cake (g) 1909 Wt Oil (g): 555

Fate of oil: Use of cake:
Price:

Analysis of seed and products
Settling time and sediment: 17.1% by vol; still cloudy after 4 days
Moisture content of seed: 3.60% Moisture content of cake: 5.40%
Oil content of seed: 48.2% mfb Oil content of cake: 27.9% mfb
Oil extraction efficiency of press: 47.8% based on crude oil yield.

Comments:
This run was carried out using a faster stroke speed but a tighter choke setting than the previous runs on sunflower seed
## RAM PRESS SURVEY: TANZANIA FEBRUARY 1993

<table>
<thead>
<tr>
<th>Owner/Village</th>
<th>Press type</th>
<th>Temp of seed into press</th>
<th>Temp of Seed press</th>
<th>Seed type</th>
<th>% oil</th>
<th>Moisture</th>
<th>mfb</th>
<th>Amount processed (kg)</th>
<th>Processed per hour (min)</th>
<th>Strokes per min</th>
<th>Press time (sec)</th>
<th>Kilo Pressed</th>
<th>Wt crude oil (grams)</th>
<th>% crude oil in cake</th>
<th>Oil content of cake (grams)</th>
<th>% oil in cake</th>
<th>Litres refined per 50 kg (ml)</th>
<th>Litres crude oil per 50kg (ml)</th>
<th>% OEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sule, Kondoa</td>
<td>CAM 25-29</td>
<td>33-35</td>
<td>SF</td>
<td>5.6</td>
<td>48.3</td>
<td>5</td>
<td>28</td>
<td>21</td>
<td>14.3</td>
<td>21</td>
<td>14.3</td>
<td>1265</td>
<td>8.1</td>
<td>3692</td>
<td>7.7</td>
<td>26.3</td>
<td>13.7</td>
<td>12.7</td>
<td>3.9</td>
</tr>
<tr>
<td>Sule, Kondoa</td>
<td>CAM 25-29</td>
<td>33-35</td>
<td>SF</td>
<td>5.6</td>
<td>48.3</td>
<td>2.5</td>
<td>15</td>
<td>24</td>
<td>6.3</td>
<td>24</td>
<td>6.3</td>
<td>779</td>
<td>8.1</td>
<td>nm</td>
<td>7.8</td>
<td>20.8</td>
<td>16.8</td>
<td>15.6</td>
<td>2.1</td>
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<tr>
<td>Msaya, Kondoa</td>
<td>CAM 30</td>
<td>40</td>
<td>SF</td>
<td>4.9</td>
<td>48.4</td>
<td>5</td>
<td>15</td>
<td>57</td>
<td>5.3</td>
<td>57</td>
<td>5.3</td>
<td>1648</td>
<td>10.3</td>
<td>3204</td>
<td>7.4</td>
<td>18.9</td>
<td>17.8</td>
<td>16.5</td>
<td>1.9</td>
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<tr>
<td>Nduka, Mirjo</td>
<td>CAM 30</td>
<td>33</td>
<td>SF</td>
<td>5.3</td>
<td>48.0</td>
<td>2.5</td>
<td>12</td>
<td>26</td>
<td>5.6</td>
<td>26</td>
<td>5.6</td>
<td>709</td>
<td>8.0</td>
<td>1763</td>
<td>7.1</td>
<td>25.0</td>
<td>15.3</td>
<td>14.2</td>
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**Notes:**
- Press type: CAM: CAMARTEC, CAP: CAPU, NS: NAND SINGH
- Temp of seed into press: oC
- Temp of Seed press: oC
- Seed type: SF: Sunflower, SES: Sesame, GN: Groundnut
- % oil: Moisture content
- mfb: Moisture content
- Amount processed (kg)
- Processed per hour (min)
- Strokes per min
- Press time (sec)
- Kilo Pressed
- Wt crude oil (grams)
- % crude oil in cake
- Oil content of cake (grams)
- % oil in cake
- Litres refined per 50 kg
- Litres crude oil per 50kg
- % OEE

**Press type**
- CAM: CAMARTEC, CAP: CAPU, NS: NAND SINGH
- mfb: not measured
- NK: not known

**Processing Methods**
- (1): Before cutting cage bars
- (2): After cutting cage bars
- (3): Heated over water bath
- (4): Heated in the sun

**Seeds**
- SF: Sunflower
- SES: Sesame
- GN: Groundnut

**Press Modifications**
- * modified, strengthened press

APPENDIX II

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**Press type**
- CAM: CAMARTEC, CAP: CAPU, NS: NAND SINGH
- mm: not measured
- NK: not known

**Seeds**
- SF: Sunflower
- SES: Sesame
- GN: Groundnut

**Press Modifications**
- * modified, strengthened press

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**Notes:**
- (1): Before cutting cage bars
- (2): After cutting cage bars
- (3): Heated over water bath
- (4): Heated in the sun
APPENDIX III

Nand Singh press in operation

Nand Singh press showing barrel
CAPU press being used for processing sunflower seed
Another CAPU press is shown in the foreground

CAMARTEC press in operation showing seed agitator
Sesame seed being processed using a modified CAMARTEC press
Example of worn tie bars

CAMARTEC press showing strengthened bearing parts
APPENDIX IV

Ram press operation in Tanzania: financial analysis

Cost of press: 120,000 TSh

CAPU PRESS

FIRST YEAR OF OPERATION: SEASON = 3 MONTHS

1. Fixed costs 120,000 TSh

2. Operating costs
   a. Seed* 170 bags @ 3500 595,000 TSh
   b. Labour 170 bags @ 200 34,000 TSh

Total operating costs 629,000 TSh

3. Income
   a. Oil: 2448 litres x 0.926** @ 400 906,739 TSh
   b. Cake: 56 bags @ 500 28,000 TSh

Gross revenue 934,739 TSh

Net revenue 305,739 TSh

Conclusion: payback period less than one year

NOTE: Maintenance and replacement part costs have not been included

* Press operating for 3 months of the year only: see below
** 7.4% refining loss

Assumes the following:
   a. 12 Kg sunflower seed processed/hour
   b. 10 hour working day
   c. 6 working days/week
   d. 12 working weeks/season
   (equal to 170 bags processed/season)
   e. labour cost Tsh 200/50 kg bag seed
   f. 14.4 litres crude oil per 50 kg bag
   g. No maintenance costs
   h. All products can be sold
Ram press operation in Tanzania: financial analysis

Cost of press: 50,000 TSh

CAMARTEC PRESS

FIRST YEAR OF OPERATION: SEASON = 3 MONTHS

1. Fixed costs 50,000 TSh

2. Operating costs
   a. Seed* 100 bags @ 3500 350,000 TSh
   b. Labour 100 bags @ 200 20,000 TSh

   Total operating costs 370,000 TSh

3. Income
   a. Oil: 1550 litres x 0.926** @ 400 574,120 TSh
   b. Cake: 33 bags @ 500 16,500 TSh

   Gross revenue 590,620 TSh

   Net revenue 220,620 TSh

Conclusion: payback period less than one year

NOTE: Maintenance and replacement part costs have not been included

* Press operating for 3 months of the year only: see below
** 7.4% refining loss

Assumes the following:
   a. 7 Kg sunflower seed processed/hour
   b. 10 hour working day
   c. 6 working days/week
   d. 12 working weeks/season
      (equal to 100 bags processed/season)
   e. labour cost Tsh 200/50 kg bag seed
   f. 15.5 litres crude oil per 50 kg bag
   g. No maintenance costs
   h. All products can be sold
Ram press operation in Tanzania: financial analysis

Cost of 2 presses: 100,000 TSh

2 CAMARTEC PRESSES

FIRST YEAR OF OPERATION: SEASON = 3 MONTHS

1. Fixed costs 100,000 TSh

2. Operating costs
   a. Seed* 200 bags @ 3500 700,000 TSh
   b. Labour 200 bags @ 200 40,000 TSh

   Total operating costs 740,000 TSh

3. Income
   a. Oil: 3100 litres x 0.926** @ 400 1,148,240 TSh
   b. Cake: 66 bags @ 500 33,000 TSh

   Gross revenue 1,181,240 TSh

   Net revenue 441,240 TSh

Conclusion: payback period less than one year

NOTE: Maintenance and replacement part costs have not been included

* Press operating for 3 months of the year only: see below
** 7.4% refining loss

Assumes the following:
   a. 7 Kg sunflower seed processed/hour
   b. 10 hour working day
   c. 6 working days/week
   d. 12 working weeks/season (equal to 200 bags processed/season)
   e. labour cost Tsh 200/50 kg bag seed
   f. 15.5 litres crude oil per 50 kg bag
   g. 2 CAMARTEC presses being operated
   h. No maintenance costs
   i. All products can be sold
Effect of handle stroke rate on throughput and yield when using the ram press

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* This test was carried out using a tighter choke setting than that used for the previous three tests.

CAM= modified, strengthened CAMARTEC press.
APPENDIX VI

Household oil clarification method used in Tanzania for sunflower seed oil produced by the ram press

Crude sunflower seed oil containing sediment is transferred to a pan and water added. The amount of water varies but is typically in the range 1:1 to 2:1 (oil:water).

The mixture is boiled for varying periods. Some operators boil the mixture until all the water is driven off and decant the oil from the residue. The residue is placed in a cloth and squeezed, the residual oil being added to that previously decanted. Other operators boil for 10-15 minutes and scoop the oil from the resulting cooled oil/water layers. Both methods produce a clear oil.

Some operators add salt and/or pieces of potato during the boiling process.

Experiment to determine loss on boiling crude oil to obtain clear oil

Crude sunflower seed oil (1863g) was placed in a pan and water (1400ml) added. The mixture was boiled for 12 minutes and left to cool for 4 minutes. The oil was scooped off using a spoon.

The weight of the clarified oil was 1725g representing a recovery rate of 92.6%. The factor 0.926 has therefore been used in this report to calculate the amount of clarified oil obtained from crude sunflower seed oil.