Review Articles

EFFECT OF FRUIT SIZE, INJURY INFLICTION TECHNIQUES AND POST INJURY HANDLING ON ROTTING OF CITRULLUS LANATUS (EGUSI – MELON) FRUITS FOR SEED EXTRACTION

OJEIFO I.M., EMUH F.N.

Abstract

Infliction of injury on the fruit of egusi seed melon is a prerequisite for the fruit rot to enable seed extraction. The effects of large, medium and small fruit sizes and three injury infliction techniques on egusi- melon fruits were evaluated to determine the best procedure to hasten rottening of the fruits prior to seed extraction. Large fruits tended to rot at a faster rate, but the small sized fruits completed rottening 2 days earlier than the large fruits which rotted about 10 days after inflicting injury on the fruits of melon. Method of inflicting injury significantly affected all the variables taken and clubbing was generally better than other methods in terms of depth of rot, rate of rot, cost of inflicting injury and damage to seeds.

Key words: Citrullus lanatus, injury infliction, fruits rot, seed extraction

INTRODUCTION

In the traditional farming system of the humid tropics, particularly in West Africa, Citrullus lanatus commonly called seed melon or egusi-melon, play a very significant role as a live-mulch as well as a food crop. According to Shippers (2000), Citrullus lanatus used as seed are much smaller than those used as desert fruits. It is sown at the beginning of the cropping season. It provides excellent ground cover (Lal, 1995), reduces the impact of rain drops on soil surface, reduces surface run-off, controls erosion (Willey, 1990; Okorie and Chinaka, 1995), and highly effective fore weed suppression (Adewusi et al., 2000; Wang et al., 2006; Segura, 2006). Some workers have effectively employed the use of melon as a live-mulch in maize, tomato and citrus seedlings nursery and the results were encouraging (Akobundu, 1980; NIHORT, 1990). Perhaps its popularity as a live-mulch is enhanced by the additional edible seeds produced. The seed provides a well relished condiment for soup, rich in vegetable protein, fat and vitamins (Rehn and Espig, 1991; Fayemi, 1999; Purseglove, 1999; Adewusi et al., 2000). However, seed processing from the fruit of melon pose some difficulties as the process could be cumbersome. According to Copeland (1976), seed processing is a vital part of the total technology involved in making available, high quality seed of improved varieties. In spite of its importance, the processing techniques of melon fruits, to extract the seed is labor intensive and lack standard practices. Processing of melon for seed takes place in about 10–12 weeks after planting, when the fruit is fully mature and the leaves and vines of the crop has started to dry up (Shippers, 2000). At this time, the fruits are normally collected in batches and subjected to various treatments such as clubbing, partial cutting or complete cut depending on the location. Any of these treatments could cause the seed (the economic yield) to separate from the fruit. After about one week, seeds will have separated themselves from the flesh remnants is now possible. The seeds mixture is usually taken away and washed in water and dried in shade. In the dry season or in semi-arid areas, such as in Sudan where water is not available, this washing can be done with sand rather than water (Shippers, 2000). The process of inflicting injury differs with locality and range from clubbing with stick until the fruit is partially broken or making an open cut at one segment or partial cuts at a segment. All this culminate into rotting of the fruits flesh, to make the seeds easily extractible for subsequent cleaning and drying, so as to obtain goods quality seeds.

The post-injury handling of fruits after inflicting injury, possibly to facilitate rotting, also differ with localities. In some areas, the site of fruit injury are turned up, in others they are turned downwards, while some growers cover the injury site with locally available materials like plantain leaves, all with the aim of facilitating rotting of fruits.

Furthermore, little is also known about the influence of these practices on the time the fruits are due for seed extraction. The study was therefore carried out to evaluate the common practices with a view to determining which of the techniques is more feasible and cost effective.

MATERIALS AND METHODS

The study was carried out at the Teaching and Research Farm of Delta State University, Asaba Campus, Asaba. Asaba Campus is located on latitude 6°14N and longitude 6°49E with latitude of 97.6 m above sea level. Matured melon fruits harvested at the end of the
growing seasons of 2006 and repeated in 2007, were used for the experiment. The melon fruits were graded into 3 sizes, namely small, medium and large whose equatorial diameter were < 8 cm, 8–11.5 cm and > 11.5 cm corresponded to < 2 kg, 2–3 kg and > 3 kg in weight, respectively. Three methods of inflicting injury on the melon fruits were by clubbing with stick, cutting completely at a segment with cutlass and partial criss-cross cuts at one segment as illustrated in Figure 1. The study was a completely randomized design with four replications in a 3 × 3 simple factorial arrangement. Observations by hand feeling and measuring rule on depth of rot was taken after inflicting injury. Subsequent, depth of rot was taken on daily basis until fruits completely rotted to determine the final depth of rot and days to complete rot. Average rot depth per day was calculated from maximum depth of rot and days to maximum rot. The data was calculated from maximum depth of rot and days to maximum rot. The data obtained were subjected to analysis of variances (ANOVA) with a view to determining the effect of the various treatments on the variables taken. While the means were separated using least square difference (L.S.D.)

RESULTS AND DISCUSSION

The fruits subjected to various methods of inflicting injury for the extraction of seeds, rotted completely between 8–11 days. The small sized fruits completed their rot 2 days earlier than the large fruits and the different fruits sizes had similar rate of rot (Table 1). The method of inflicting injury significantly affected maximum rot depth, days to maximum rot and daily average rot (Table 1). Clubbing was superior probably because the pressure created spread throughout the fruit thereby causing lines of weakness and open spaces for microbes to degrade the fruit at a faster rate. On the other hand, the cutting methods are only partial in creating pressure on the fruits and in some cases; the injury caused could even heal instead of causing rot. Clubbing and partial cut resulted in similar maximum depths of fruit rot which are significantly deeper than complete cut (Table 1). It would appear that complete cut does not enhance complete rotting because of higher tendency to heal up.

Clubbing of fruits produced the highest daily average rot depth and was followed by complete cut and the least was partial cut of melon fruits. With regards to days to maximum rot, clubbing and complete cut were superior to partial cut of fruits. Clubbing thus appears to be more efficient when compared to other methods of inflicting injury on melon fruits for seed extraction. Clubbing is a low input technique with minimum damage to the seeds (Table 1). At one stroke of club, the fruit is sufficiently softened, while cutting may take up to two strokes, coupled with careful shifting of cut fruits

Fig. 1: Three common techniques of inflicting injury on melon fruit for seed extraction

A: Clubbed fruit with lines of weakness  B: Completely cut fruit segment with lid by the side of the cut fruit  C: Partial criss-cuts on fruit

<table>
<thead>
<tr>
<th>Fruit size</th>
<th>Method of inflicting injury</th>
<th>Maximum rot depth (cm)</th>
<th>Days to maximum rot</th>
<th>Daily average rot depth (cm/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CL</td>
<td>CC</td>
<td>PC</td>
<td>Mean</td>
</tr>
<tr>
<td>Small</td>
<td>8.38</td>
<td>7.32</td>
<td>8.70</td>
<td>8.13</td>
</tr>
<tr>
<td>Medium</td>
<td>11.25</td>
<td>8.95</td>
<td>10.82</td>
<td>10.34</td>
</tr>
<tr>
<td>Large</td>
<td>14.18</td>
<td>11.47</td>
<td>12.91</td>
<td>12.84</td>
</tr>
<tr>
<td>Mean</td>
<td>11.25</td>
<td>9.25</td>
<td>10.81</td>
<td>10.44</td>
</tr>
<tr>
<td>S.E.</td>
<td>0.16</td>
<td>0.12</td>
<td>0.31</td>
<td>0.39</td>
</tr>
<tr>
<td>L.S.D. (P = 0.05)</td>
<td>0.45</td>
<td>0.33</td>
<td>0.88</td>
<td>1.11</td>
</tr>
</tbody>
</table>

The methods of inflicting injury are: CL = clubbing, CC = complete cut and PC = partial cut
Table 2: Labor hour, cost and possible damage incurred due to the techniques of inflicting injury on various sizes of fruit.

<table>
<thead>
<tr>
<th>Fruit size</th>
<th>Method of inflicting injury</th>
<th>Estimated man hour/ha Mean</th>
<th>Cost at N500/manday Mean</th>
<th>Damage (rating)* Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CL</td>
<td>CC</td>
<td>PC</td>
<td>Mean</td>
</tr>
<tr>
<td>Small</td>
<td>75</td>
<td>150</td>
<td>158</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>200</td>
</tr>
<tr>
<td>Large</td>
<td>125</td>
<td>250</td>
<td>350</td>
<td>242</td>
</tr>
<tr>
<td>Mean</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>200</td>
</tr>
</tbody>
</table>

*Damage rating: 1 = Minimum number of damage to seeds; 5 = 20% damage of seeds to create new fruit position for cutting so as not to damage seed of adjacent fruit. Deeper cuts damage seeds while clubbing with a very high pressure only forces some seeds out of the fruit, which can be retrieved easily. Partial cutting methods damage some of the seeds and takes more time for seed extraction. Operational cost is critical in assessing the efficiency of any technology. In this study, the man hour and or cost in monetary terms required to cause fruit of melon to rot for seed extraction was reduced significantly by 60% by clubbing fruits and reduced to 30% by complete cut, while partial cut required the highest man hour (Table 2). Seed damage arising from inflicting injury on melon fruits for seed extraction was lowest in clubbed fruits while it almost tripled with respect to complete cut, and more than tripled for partial cut (Table 2).

When considered against efficiency in fruit rotting, cost and possible levels of seed damage, clubbing distinctly stands out to be the most appropriate and efficient techniques of inflicting injury on fruits, irrespective of fruit size. In advancing the technology of processing melon, development of machine that would stimulate clubbing of melon fruits will be most appropriate and economic method of inflicting injury on melon fruit for subsequent seed extraction irrespective of the fruit size.

REFERENCES


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