A bibliography on post-harvest losses in cereals and pulses with particular reference to tropical and subtropical countries (G110)

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G110  

A bibliography on post-harvest losses in cereals and pulses with particular reference to tropical and subtropical countries

J. M. Adams
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Introduction

Several excellent reviews on losses which occur during storage have been published in the last 10 to 15 years but very little has been written on losses which occur at all points in the post harvest system (from the mature crop in the field to the time of consumption). This bibliography encompasses the complete system for losses in cereals and pulses in an attempt to fill in some of the gaps but perhaps as important, it also shows where information is lacking. The list of references is by no means exhaustive and only includes those references which the author had to hand by the end of July 1976. An updating volume may be published when sufficient additional references have been collected.

In order to help the reader to locate appropriate references the material has been arranged in two ways. First information in the references has been tabulated and cross-referenced according to subject (Tables 1 to 6). Second, the references, which are listed alphabetically by author, have been grouped into three major categories according to the type of work described, i.e. reviews, experimental work and field estimates. Field estimates have been further subdivided into provisional estimates, supported estimates, and complete estimates.

The reviews (numbered R1—R60) are papers which, in some cases, merely requote loss estimates indexed under another author in order to demonstrate the importance of applying appropriate protection measures. In other cases they give a more detailed review of research into the methodology of post harvest loss assessment.

Experimental work (numbered E1—E79) includes work done either in the laboratory or as a small scale field trial, such as an investigation of specially constructed stores on a research site. In most cases the results of this research have not been applied by their investigators to situations occurring in normal practice. These references have been cross-referenced only according to commodity and cause (Table 1).

Field estimates are references concerned with estimates of loss and the methods used to obtain these in the field. They have been subdivided, according to the extent of information provided and the completeness of the investigation, into three categories:

1. Provisional estimates (numbered A1—A52) are those which consist entirely of an estimate of loss without any detailed description of the method by which it was obtained.
2. Supported estimates (numbered B1—B63) are those in which the estimate of loss is supported by details of the method by which it was obtained but has some components absent or not clearly documented.
3. Complete estimates (numbered C1—C11) are those which are fully documented and give the reader sufficient information on the methods employed to enable a decision to be made about the reliability of the estimate.

Tables 1 to 6, each arranged by commodity and cross-referenced by various factors, precede the lists of references. Review material has not been cross-referenced in the tables and experimental work is cross-referenced only by cause of loss, (Table 1).
Tables 1 to 5 only include references drawn from the three Field Estimates lists.

Table 2 subdivides the references by region. Only a few general estimates are included for Europe and North America for comparison with the tropical and subtropical estimates. Those references which contain methodologies suitable for use in other regions have also been included. West Africa is included as representative of the more humid region of Africa since there is minimal information from the Sahelian zone. The rest of Africa is included under East, Central and Southern Africa. Asia includes such areas as Indonesia and the Philippines which are important for their work on paddy and rice. No references have been included for Australia and none were available for any of the Pacific Islands.

In Table 3 sub-division is by the cause of loss. Very few separate references to losses caused by mites were available and most microbiological losses were caused by fungi.

In Table 4 sub-division is by type of loss. The distinction between types of loss is not sharply defined but quantity is regarded as any estimate expressed in terms of weight loss whereas quality mainly includes estimates of damage. Therefore many references appear under both sub-headings. In cases where there is doubt the estimate is listed as unspecified.

Table 5 is subdivided according to the level within the post harvest system at which the loss is measured. Trader/Cooperative is taken as the level above the farmer and does not extend into large scale commercial practice. Large scale includes both bag and bulk handling facilities.

In Table 6 sub-division is according to the particular activity within the post harvest system during which the loss occurs. Harvesting is included since it is a post maturity loss and is not normally included within pre-harvest crop loss appraisal methodology. For convenience the major mechanical processes that occur between harvest and consumption are placed together, a glance at the title of the reference will distinguish the various processes.

It is fairly simple to trace a specific reference using the tables, for example: a loss estimate for maize storage at farm level in East Africa can be found by listing all the maize references for East Africa in table 2 and checking for maize under farm in Table 5 and storage in Table 6 to eliminate unwanted references.

Where a pulse has not been given a generic name by the author and it is not obvious from its common name into which category it falls, it has been placed under PULSES: General, e.g. beans may not always be Phaseolus spp.
## Table 1

**Experimental work: cause of loss cross-referenced by commodity**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Biological factors</th>
<th>Physical factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insects and Mites</td>
<td>Vertebrates</td>
</tr>
<tr>
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</tr>
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<td></td>
</tr>
<tr>
<td>General</td>
<td>E35, E37, E39, E69</td>
<td></td>
</tr>
<tr>
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<td>E8, E29, E31, E44, E54</td>
<td></td>
</tr>
<tr>
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<td>E29, E39, E44, E74, E75, E78</td>
<td>E9</td>
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<td>Others</td>
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<tr>
<td><strong>PULSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>E9, E40, E49</td>
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<td>E4, E14, E26, E30, E57, E58, E69</td>
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</tr>
<tr>
<td>Phaseolus spp.</td>
<td>E2, E14, E26, E30, E55, E57, E61, E72, E77</td>
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</tr>
<tr>
<td>Cicer spp.</td>
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<tr>
<td>Other pulses</td>
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<td>Other Oilseeds</td>
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### Table 2

Field estimates: geographical region cross-referenced by commodity

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<th>Africa</th>
<th>Asia, including Far East</th>
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<td><strong>Geographical region</strong></td>
<td><strong>Central and South and West Indies</strong></td>
<td><strong>North</strong></td>
<td><strong>West</strong></td>
<td><strong>East, Central and Southern</strong></td>
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<td>A29, B4, B56</td>
<td></td>
<td>A38, C2</td>
</tr>
<tr>
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<td></td>
<td>A7, A11, A39, A41, B2, B3, B38, B39, B54</td>
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<td>B14</td>
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<td>B34</td>
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<td>A44, B1</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td>A41, A43, B54</td>
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<td></td>
<td>A31</td>
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<tr>
<td>Cicer sp.</td>
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<td></td>
<td>A31</td>
</tr>
<tr>
<td>Other pulses</td>
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<td></td>
<td>A38, A46, B15, B29, B31, C4, C11</td>
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<tr>
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<td></td>
<td></td>
<td>A31</td>
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<tr>
<td>Other oilseeds</td>
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<td>A51</td>
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<td>Physical factors</td>
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</tr>
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<td>Maize</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Paddy/rice</td>
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</tr>
<tr>
<td>Sorghum/millet</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Wheat</td>
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</tr>
<tr>
<td>Others</td>
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<tr>
<td>Vigna spp.</td>
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<tr>
<td>Cicer spp.</td>
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</tr>
<tr>
<td>Other pulses</td>
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</tr>
<tr>
<td>Groundnuts</td>
<td></td>
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<tr>
<td>Other oilseeds</td>
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## Table 4

Field estimates: type of loss cross-referenced by commodity

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Type of loss</th>
<th>Quantity</th>
<th>Quality</th>
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<th>Germination</th>
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<tr>
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<td>A34, B25, B45</td>
<td>A33</td>
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<tr>
<td>Maize</td>
<td></td>
<td>A6, A10, A11, A14, A24, A28, A48, A51, B2, B3, B9, B16, B18, B20, B28, B36, B38, B39, B42, B43, B49, B54, B58, B60, C1, C4, C8, C9, C11</td>
<td>A6, A7, A14, A32, A39, A48, B12, B22, B31, B42, C1, C6, C9</td>
<td>A34, B3, C1</td>
<td>A31, A41</td>
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</tr>
<tr>
<td>Sorghum/millet</td>
<td></td>
<td>A6, A11, A24, A43, A48, B24, B42, B59, C3</td>
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<td>A20</td>
<td>A34, B44</td>
<td>A1, A31</td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td>A12, A17, A24, A26, A44, A48, B1, B7, B23, B26, B27, B35, B37, B46, B47, B52, B63, C4, C11</td>
<td>A12, A17, A30, A34, A48, B14, B26, B27, B47, B52, B62</td>
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<td>A34, B26, B46, B47</td>
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<tr>
<td>Others</td>
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<td>A34</td>
<td></td>
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<tr>
<td>PULSES</td>
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<tr>
<td>General</td>
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<td>A20, A26</td>
<td>A41</td>
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<td>A1, A31</td>
<td>A31, A40</td>
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<td>A35</td>
<td>A20, A26</td>
<td>A41</td>
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<td>A41</td>
<td></td>
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<td>A35, C6, C7</td>
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<td>A31</td>
<td></td>
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<tr>
<td>Groundnuts</td>
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<td>A3, A43, A46, B15, B21, B29, C5</td>
<td>A3, A38, A46, B15, B21, B29, C5</td>
<td>A31</td>
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<tr>
<td>Other oilseeds</td>
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<td>A31</td>
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<td></td>
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<td>GENERAL</td>
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<td>A30, A45</td>
<td>B56</td>
<td>A18, A22, A23</td>
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### Table 5

Field estimates: level within post harvest system cross-referenced by commodity

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Level</th>
<th>Farm</th>
<th>Trader/Cooperative</th>
<th>Large Scale</th>
<th>Unspecified</th>
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<td>A29, B4, B13, B55</td>
<td>A27, A34</td>
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</tr>
<tr>
<td>Sorghum/millet</td>
<td>A1, B24, B42, B44, B59, C3</td>
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<td>A20, A24, A31, A34, A43, A48</td>
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</tr>
<tr>
<td>Wheat</td>
<td>A17, B14, B23, B27, B35, B47, B53, B62, B63</td>
<td>B26, C11</td>
<td>A12, B1, C4, C11</td>
<td>A20, A24, A26, A34, A44, A48, B7, B46</td>
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<td>C11</td>
<td>C11</td>
<td>A34, A48</td>
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<td><strong>PULSES</strong></td>
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<td></td>
<td></td>
</tr>
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<td>C6, C7</td>
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</tr>
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<td>A46</td>
<td>A3, B15, C5</td>
<td>A31, A38, B21</td>
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<tr>
<td>Other oilseeds</td>
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<td>B21, C4, C11</td>
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<td>A12, A30</td>
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Table 6
Field estimates: activity in post-harvest system cross-referenced by commodity

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Activity</th>
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<th>Threshing, drying, handling, processing</th>
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<th>Transport</th>
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<tr>
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<tr>
<td>General</td>
<td></td>
<td></td>
<td></td>
<td>A20, A24, A28, A35, A41, A43, B13, B17, B19, B37, B52, B54</td>
<td></td>
</tr>
<tr>
<td>Vigna spp.</td>
<td></td>
<td></td>
<td></td>
<td>A1, A4, A8, A16, A31, A42, B10, B11</td>
<td></td>
</tr>
<tr>
<td>Phaseolus spp.</td>
<td></td>
<td></td>
<td></td>
<td>A31, A40</td>
<td></td>
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<tr>
<td>Cicer spp.</td>
<td></td>
<td></td>
<td></td>
<td>A35, B46</td>
<td></td>
</tr>
<tr>
<td>Other pulses</td>
<td></td>
<td>C6, C7</td>
<td></td>
<td>A5, A35</td>
<td>B48</td>
</tr>
<tr>
<td>Groundnuts</td>
<td></td>
<td></td>
<td></td>
<td>A3, A31, A46, B15, B21, B29, C5</td>
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<tr>
<td>Other oilseeds</td>
<td></td>
<td>B31, C11</td>
<td></td>
<td>A35</td>
<td>C4, C11</td>
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<tr>
<td>GENERAL</td>
<td></td>
<td>A30</td>
<td></td>
<td>A12, A19, A23, A30, A37, A51, B5, B56</td>
<td>A19, A30</td>
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</table>
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