

# L<sup>A</sup>T<sub>E</sub>X - A DOCUMENT PREPARATION SYSTEM FOR AGRICULTURAL EXTENSION PROFESSIONALS

C. Igathinathane, K. Hellavang, C. Thorson, T. Faller, L. Backer

**ABSTRACT.** *LaTeX (L<sup>A</sup>T<sub>E</sub>X) is an open source document preparation system for documents of professional quality. Extension professionals trying reach their clientele through various forms of printed and online resources can benefit from the vast potential of L<sup>A</sup>T<sub>E</sub>X. Using L<sup>A</sup>T<sub>E</sub>X empowers the extension professionals with the capability of creating their own documents from start to finish, with good timing and qualities matching or sometimes surpassing from that obtained using the present systems. This educational article describes typesetting process, obtaining and installing L<sup>A</sup>T<sub>E</sub>X, creating and running a simple document, and creating ASABE journal paper, as well as advanced extension publication related features, such as side-by-side and wrapped figures, background figures, minipages, oral presentation slides, conference posters, and newsletters using appropriate L<sup>A</sup>T<sub>E</sub>X classes and packages. All these aspects were explained with examples, commands and principles involved, and graphics while providing L<sup>A</sup>T<sub>E</sub>X code sections and fully functional codes to reproduce the outputs generated. Although there is some learning involved while using L<sup>A</sup>T<sub>E</sub>X, the benefits could outweigh the effort. With further experience, the professionals could be able to create more sophisticated documents, automate several aspects of document preparation, and make it easy for others by creating templates. Impact of the extension activities effort through publications might be ensured through the timeliness and professional quality output when L<sup>A</sup>T<sub>E</sub>X was used, due to bypassing typesetting personnel and directly creating the quality final draft.*

**Keywords.** *ASABE, Extension, LaTeX, Newsletter, Poster, Typesetting.*

**L**aTeX is a free open source electronic document production typesetting system that produces professional quality documents. LaTeX (logo: L<sup>A</sup>T<sub>E</sub>X) is pronounced “Lay-tech” or “Lah-tech” and is based on TeX (logo: T<sub>E</sub>X), which is pronounced “Tech,” a powerful typesetting program. TeX was created by Donald E. Knuth (Knuth, 1984), and L<sup>A</sup>T<sub>E</sub>X by Leslie Lamport (Lamport, 1986). L<sup>A</sup>T<sub>E</sub>X is a markup programming language, similar to HTML, and the typed in source codes when compiled will produce a well formatted final document for viewing or printing. L<sup>A</sup>T<sub>E</sub>X is extremely popular in the scientific and academic communities, and used extensively in industry (Lamport, 1994). Scientists and engineers worldwide, especially from mathematics, physics, electrical, electronics, and computer sciences, use L<sup>A</sup>T<sub>E</sub>X for the production of professional quality technical articles, books, and reports for more than 25 years. Several

established publishing organizations (e.g., Elsevier, Springer, Wiley, CRC, SAS Institute, Oxford University Press, Cambridge University Press) use L<sup>A</sup>T<sub>E</sub>X as their system of production and encourage the authors to submit articles and books using L<sup>A</sup>T<sub>E</sub>X. However, L<sup>A</sup>T<sub>E</sub>X is relatively unknown and has not been used by vast majority of agricultural and biological engineers, scientists, and extension professionals.

L<sup>A</sup>T<sub>E</sub>X is a dynamic system that ever grows and gets updated with various user-developed classes, packages, and templates, and all that are available for updating to all users. An exhaustive illustrated list was reported (Igathinathane, 2011) of advantages and issues that are associated with using L<sup>A</sup>T<sub>E</sub>X over the commonly used Text Processing Systems (TPS). Some of those major aspects favoring L<sup>A</sup>T<sub>E</sub>X are: Independent of computer system - runs on all; automation of table of contents, list of figures, list of tables, index, nomenclature, glossary, and bibliography citation and list generation; free and customizable; incorporation of professional typesetting principles; consistent formatting; camera-ready outputs; handling large document projects; single file generating draft, final, and revised annotated manuscripts; drawings creation with codes; and automatic updating of moved document elements during revision. While the major issue is the steep learning curve, which is true with any programming language/tool. Additional information on these topics can be searched online.

Extension professionals reach their clientele through various forms of printed (e.g., peer-reviewed journal articles, non-peer-reviewed extension articles, news letters, extension pamphlets and fliers, posters), and online resources (e.g., web

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pages, presentations, pdf copies of printed extension materials). Extension professionals go through all the stages of document preparation (writing and formatting and layout to some extent) and the final product will be prepared by production specialists (copy editing + typesetting) using high-end, specialized, expensive software, with a unique format and style specific to the “Extension Services” of the respective university. In their publications they use a lot of colors, pictures, and larger fonts for their documents. Here again the authors will supply the text in blank format and rely solely on the production specialists for the the final output.

However, using  $\LaTeX$ , the extension professionals can able to create documents of their choice from scratch or using available templates that matches or surpasses outputs of professional quality. The input file containing the codes, which are nothing but  $\LaTeX$  commands and document text will be compiled to produce usually a pdf output. These source code files are usually a small-sized ASCII files.

$\LaTeX$  is a structural language with “logical design” that is highly customizable and will different from the common “*What You See Is What You Get*” (WYSIWYG) menu driven “visual design” based TPS. With TPS the test is input based on some user-selected attributes, and the output differs among users unless a common template is used. However, for very small documents the common TPS is the logical choice. Following are the quotes from the developers of  $\TeX$  and  $\LaTeX$ :

*“I never expected TeX to be the universal thing that people would turn to for the quick-and-dirty stuff. I always thought of it as something that you turned to if you cared enough to send the very best.”*

—Donald Knuth; (Knuth, 2010)

*“ $\LaTeX$  is easy to use — if you’re one of the 2% of the population who thinks logically and can read an instruction manual. The other 98% of the population would find it very hard or impossible to use.”*

—Leslie Lamport; (Lamport, 2000)

It is logical to assume the extension professionals, agricultural scientists, and graduate students “care enough” and belong to the “2%” of the educated population that could use  $\LaTeX$  that is based on  $\TeX$ .

The other high-end desktop publishing programs were quite expensive (currently priced around \$700 or higher), and were usually owned by professionals. Like most of the commercial software, these programs were restricted to only the computer they were installed, and to have current version running the updates or upgrades should also be subsequently purchased. Although several user-friendly features available, these expensive commercial software were out of the reach of most common users. On the other hand with  $\LaTeX$ , being an open source, all new developments (updates and upgrades of packages) are readily available for free ensuring users current software, while offering uncompromised output quality similar to commercial software. Despite  $\LaTeX$  being “programming-like,” it offers the extension professionals an additional useful

tool at their disposal and empowers them to produce the “final output.”

As timing is key in extension activities, with  $\LaTeX$  the extension professionals could able to meet the demands, as they now control the whole publication process, most often with enhanced quality surpassing the typical TPS document quality familiar to them erstwhile. The cost saving realized will also come in handy with limited extension budget on publications. For information on the preparation of peer-reviewed articles (e.g., Elsevier, ASABE journals) using  $\LaTeX$ , another outlet of extension publication, the article that is applicable to agricultural and biological engineers and scientists of Igathinathane (2011) can be referred. Also other resources (Elsevier Ltd., 2009) will be quite helpful.

This article introduces  $\LaTeX$ , a no-cost, high-quality electronic publishing tool to extension professional for production of the professional extension documents, especially extension articles, newsletters, presentations and posters. These documents involve handling of figures in several ways, colors, text, columns, minipages, and templates of posters and presentations. Examples, explanations, and source codes (segments and fully functional) were provided for every aspect.

## OVERVIEW OF $\LaTeX$ SYSTEM

### GENERAL TYPESETTING OF DOCUMENTS

It is helpful to understand the stages of professional document preparation to appreciate the role of the  $\LaTeX$  system. The various stages of document processing before computers are: (i) an author would prepare a manuscript either by hand or typewriter or computer, (ii) the manuscript gets submitted to a publisher (or) editor, who calls for revisions and rewrites, (iii) after acceptance gets handled by a copy editor, who would decorate the manuscript with markups and marginal notes, and (iv) these instructions inform the typesetter about fonts and spacings and other typographical features should be used to convert it to the final printed form that one expects of books and articles (Kopka and Daly, 2004).

Now with  $\LaTeX$ , the author type in the typesetting information in the source file with manuscript text, and the  $\LaTeX$  takes over the role of copy editor and typesetter and produces consistent professional output based on the author’s instructions. Thus handing the power to the author to produce documents of final quality, so far produced only by a team of typesetting professionals; however, the role of editor and publishers obviously cannot be overlooked or bypassed. Using existing system, for instance, with peer-reviewed articles, the authors have to wait for several months, sometimes even years, before receiving the professionally typeset proof; until then the authors will not have any idea of how the finished article will look in the final production. This happens because the TPS and format used for manuscript preparation is completely different from that used in professional production. But with  $\LaTeX$  using the templates supplied by the publishers (journal or book), the authors prepare a single flat file (ASCII file) that essentially serves both as draft and final output — giving the

“journal or book feel” readily from the very beginning of the writing process.

## DOWNLOADING AND INSTALLING L<sup>A</sup>T<sub>E</sub>X

A working L<sup>A</sup>T<sub>E</sub>X software is comprised of a compiler and an editor. The free compiler for Windows is **MiKTeX 2.9** (<http://miktex.org/2.9/setup> includes **TeXworks** front-end editor), and for Mac is **MacTeX-2010** (<http://www.tug.org/mactex/> includes **TeXShop** front-end editor). The installation also include the required T<sub>E</sub>X files. Popular front-end L<sup>A</sup>T<sub>E</sub>X editors that have several user-friendly features are: **TeXnicCenter** (<http://www.texniccenter.org/>), **TeXMakerX 2.0** (<http://texmakerx.sourceforge.net/>), **WinShell** (<http://www.winshell.org/>), etc. An alternative easy to install Windows L<sup>A</sup>T<sub>E</sub>X system is **proTeXt** (<http://www.tug.org/protext/>) based on MiKTeX that also installs the front-end TeXnicCenter. An **Adobe Reader** (<http://get.adobe.com/reader/>) or **Adobe Acrobat** (<http://www.adobe.com/>) is also required to view and use pdf output. Helpful installation information of these packages/bundles are available in their respective websites.

## LEARNING TO WORK WITH L<sup>A</sup>T<sub>E</sub>X

To learn L<sup>A</sup>T<sub>E</sub>X, several authentic print (Kopka and Daly, 2004; Lamport, 1994; Mittelbach et al., 2004) and excellent free online sources are available (Chang, 2010; Downes, 2002; Krishnan, 2003; Oetiker et al., 2010; Roberts, 2009; Silmaril Consultants, 2009; Voß, 2010; Wikibook Contributors, 2008; Wilson, 2009). It should be noted that simple documents that involve common features like title, section titles, body text, alignment, and font features (e.g., bold, italics, small-caps) can be easily prepared; while incorporation of advanced features require some learning, but always achievable as people from other fields successfully use L<sup>A</sup>T<sub>E</sub>X on day-to-day basis. After gaining some working knowledge, the users can easily work on the various templates based on the available instructions and create desired outputs. The various new features that were added in the form user-developed packages and their usage could be learned from the accompanying documentation. Links of html and pdf documentation of more than 1580 packages and guides sorted by names are included in the TeX Live bundle (e.g., <file:///usr/local/texlive/2010/doc.html>) during L<sup>A</sup>T<sub>E</sub>X installation.

## A SMALL SAMPLE L<sup>A</sup>T<sub>E</sub>X DOCUMENT

### Document Source Code and Output

Commands and regular text form the L<sup>A</sup>T<sub>E</sub>X document. Figure 1 shows a small L<sup>A</sup>T<sub>E</sub>X document with source code and pdf output. This illustrates the document structure elements and modes in typesetting. The source code is a plain text file (\*.tex) and can be created with any text editor or L<sup>A</sup>T<sub>E</sub>X integrated environment front-end editors. When compiled using pdfL<sup>A</sup>T<sub>E</sub>X compile command, the pdf output produced (fig. 1) and a brief description of the code is presented subsequently.

L<sup>A</sup>T<sub>E</sub>X documents have a general structure of “preamble” and “body.” The preamble has the compiler instructions —

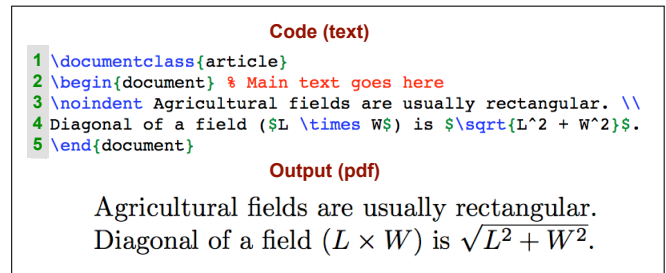


Figure 1. A small L<sup>A</sup>T<sub>E</sub>X document source code and its pdf output.

containing documentclass, packages used, document settings, and shortcuts. The actual document material goes into the body that can be divided into “front-matter” — containing title, author, abstract, keywords, etc.; “body text” — containing sections, subsections, paragraphs, lists, figures, tables, equations, etc.; and “back-matter” — containing references, appendices, index, etc. This minimal document (fig. 1) does not show all these sub-components. Commands are simply instructions to the compiler and will not appear in the output but control it. Commands are identified by a starting backslash character ‘\’ followed by the command text, then by the optional arguments enclosed in square brackets ‘[...]’, and by the necessary arguments enclosed in braces ‘{...}’ (e.g., `\usepackage[usenames,dvipsnames]{xcolor}`) or without any arguments (e.g., `\centering`), and separated by a final space. The number of the arguments varies with commands. The regular text materials are ASCII text and they belong to two modes: the default “text” where material is simply typed, and the “math” where mathematical elements are enclosed between dollar characters ‘ $...$ ’ and other forms.

### Description of the Document Source Code

A brief description of a very small L<sup>A</sup>T<sub>E</sub>X document source code (fig. 1) is presented herein. The document preamble section has the `\documentclass` command with `article` as the argument. The other possible arguments are `book`, `letter`, `report`, `slides`, and `letter`. The command pair `\begin{document}` and `\end{document}` on lines 2 and 5 signify the main document environment, where the actual content of the document was coded. The portion of the text after percent sign (“% Main text goes here”) is the comment, which could be used to include documentation remarks, and will not be compiled for the output. The commenting can also be applied to valid L<sup>A</sup>T<sub>E</sub>X code sections to avoid the compiler to include them in the output during code development or used as toggle switches for various well-laid options. If the editors support color-coding, the commenting usually result in some color change (e.g., “red” in this case). The simple command `\noindent` on line 3, having no argument, suppresses the default indent provided at the start of any paragraph. The `\\` (double backslash) means carriage return or newline. The math mode (`$...$`) on line 4 produced the mathematical symbols in italics ( $L$  and  $W$ ), the `\times` produced the multiplication symbol, the `\sqrt{...}` command produced square root symbol over the entire argument, and the `^` operator produced

the superscripts. It can be seen that every aspect of the document including the formatting instructions should be coded in the input (\*.tex) file. Thus with appropriate commands and environments any document with required content and style can be logically typeset. The standard L<sup>A</sup>T<sub>E</sub>X resources mentioned earlier and the companion article (Igathinathane, 2011) may be referred to for further details on developing documents.

## RUNNING AND DEBUGGING L<sup>A</sup>T<sub>E</sub>X DOCUMENT

L<sup>A</sup>T<sub>E</sub>X document can be run using the command buttons or shortcuts of the front-end editors or through terminal command lines. The usual sequence are “compiling or building,” followed by “viewing” the final pdf output. The command “Typeset” also refers to compiling. Compiling can be performed by selecting appropriate compiler (L<sup>A</sup>T<sub>E</sub>X, pdfL<sup>A</sup>T<sub>E</sub>X, BibL<sup>A</sup>T<sub>E</sub>X, MakeIndex, etc.). During compilation several small sized auxiliary files with extensions such as aux, bbl, blg, fff, lof, log, lot, out, spl, syncTeX.gz, toc, and ttt will be generated, and while retaining the source (tex) and output (pdf) files the others can be deleted after finalization.

For debugging the document, when faced with errors, the compiler generated warnings and errors displayed on console with line numbers or the same listed in the log file (\*.log) can be used as clues. Fixing the errors means correcting the document source based on the compiler messages. Similar to any programming language, a simple typo such as a missing matching curly braces, or misspelled command will interrupt the compiler and produce errors and warnings. Reading the generated errors, fixing the code, and recompilation are routine operations with programming languages, and the skills develop with practice. The compiler also responds to the user actions through console commands (‘r’ - nonstopmode; run without stopping), ‘q’ - batchmode; run quietly, and ‘x’ - quit, and ‘h’ - help; will display limited help programmed in the compiler). Many a times it is useful to run the compiler through, despite warnings or errors, and see the output and later performing the code corrections.

## ASABE STYLE SAMPLE PAPER

A stripped down yet fully functional version of the ASABE journal style template, which uses “asabe.cls” that was developed by Igathinathane (2011) based on Elsevier’s “elsarticle.cls,” is presented in fig. 2. The document class (asabe.cls; line: 1) has the necessary font and formatting instructions and the users need to type in their article related specific information only, thus making it easy for them to create the ASABE journal style articles right away.

In the preamble of the document (fig. 2) the packages (\usepackage), new shortcuts or commands (\newcommand), and the reference citing style (\citesytle(egu)) used were defined (lines: 3–8). The main document is enclosed in document environment (identified by \begin{} ... \end{} pair) which encloses all other components including other environments of the article (lines: 10–39). The frontmatter environment has the commands (\title and \author) and sub-

```

1 \documentclass[final,5p,times,twocolumn]{asabe}
2 %-----
3 \usepackage{graphicx,amssymb,amsmath,booktabs,ifthen,xspace,lineno,caption}
4 \usepackage{upgreek,fancyhdr,lastpage,subfigure,wallpaper,wrapfig,sidecap}
5 % Other packages goes here
6 \newcommand\lx{\LaTeX\xspace} \newcommand\tx{\TeX\xspace}
7 % Other commands and shortcuts goes here
8 \citesytle(egu)
9 %-----
10 \begin{document}
11 \begin{frontmatter}
12 \title{LaTeX - A Document Preparation System for
13 Agricultural-Extension Professionals}
14 \author{C.-Igathinathane,\, K.-Hellavang,\,C.-Thorson,
15 \, T.-Faller, \, L.-Backer}
16 \begin{abstract}
17 LaTeX (\lx) is an open source document % ... Text skipped ...
18 \end{abstract}
19 \begin{keyword}
20 ASABE \sep Extension \sep LaTeX \sep Newsletter \sep Poster
21 \sep Typesetting
22 \end{keyword}
23 \end{frontmatter}
24 %-----
25 % Main "Body Text" starts here
26 \nonumberfootnote{\vskip5mm The author % ... Text skipped ...
27 }
28 \firstword{L}{aTeX} is a free open source electronic document production
29 typesetting system that produces professional quality documents. LaTeX
30 (logo: \lx) is pronounced 'Lay-tech' or 'Lah-tech' and is based on TeX
31 (logo: \tx), which is pronounced 'Tech,' a powerful typesetting program.
32 \tx was created by Donald E. Knuth \cite{Knuth1984}, and \lx by Leslie
33 Lamport \cite{Lamport1986}. \lx is a markup programming language % ...
34 Text skipped ...
35 \lx is a dynamic system that ever grows % ... Text skipped ...
36 %-----
37 \section*{Overview of \lx System}
38 \subsection*{General Typesetting of Documents}
39 It is helpful to understand the stages of professional document preparation
40 to appreciate the role of the \lx system. The various stages of document
41 processing before computers are: % ... Text and other sections
42 skipped ...
43 %-----
44 \raggedright % References section starts automatically
45 \bibliographystyle{chicago} % Style corresponds to ASABE (*.bst file)
46 \bibliography{refs} % User bibliography database (*.bib file)
47 \end{document}
48 %-----

```

Figure 2. ASABE document style (asabe.cls) template with filled details.

environments (abstract and keyword). Since the template was already populated with the necessary commands, the first input from the user starts with filling in the title (\title{...}; lines: 12–13). Similarly the author (\author{...}; lines: 14–15), abstract and keywords information were input as shown (fig. 2). Within the abstract environment (lines: 16–18) the text of regular and ‘math’ modes as well as L<sup>A</sup>T<sub>E</sub>X commands can be typed in. The shortcut command \lx (line: 17) produces the L<sup>A</sup>T<sub>E</sub>X logo that was already defined (line: 6). In the keyword environment (lines: 19–22), the command \sep separates the keyword entries. The results of these inputs after compiling will result in a pdf file and its first page (this article) is shown in fig. 3.

The author affiliation information (fig. 3) was coded as a footnote (line: 26–27), and the text shown in bold was produced by \textbf command (e.g. \textbf{ASABE Member Engineer} produces **ASABE Member Engineer** in the selected font size).

The main article body text was composed of sections and subsections. The introduction part of the ASABE article start with dropped capital letter and this was produced through the \firstword command, which has two arguments namely the first letter and the rest of the word (line: 28). This command was predefined in the “asabe” class. The rest of the paragraph is composed of usual L<sup>A</sup>T<sub>E</sub>X text and commands.

The bibliography \cite command (e.g., \cite{Knuth1984}) cites the reference in-place and lists

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Wiley, CRC, SAS Institute, Oxford University Press, Cambridge University Press) use L<sup>A</sup>T<sub>E</sub>X as their system of production and encourage the authors to submit articles and books using L<sup>A</sup>T<sub>E</sub>X. However, L<sup>A</sup>T<sub>E</sub>X is relatively unknown and has not been used by vast majority of agricultural and biological engineers, scientists, and extension professionals.

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Figure 3. The front page of this article in ASABE journal style using the `asasbe.cls` and `template`.

it in the reference section as well. This process is also known as “Cite While You Write,” available only with dedicated referencing software. This command works in combination with BibL<sup>A</sup>T<sub>E</sub>X (a companion bibliography program), and further details on handling bibliography can be found elsewhere (Daly, 2010; Igathinathane, 2011; Markey, 2009; Patashnik, 1988).

In L<sup>A</sup>T<sub>E</sub>X, paragraph endings are marked by a blank line(s) (line: 29) followed by valid L<sup>A</sup>T<sub>E</sub>X text and command, which makes the compiler to start a new paragraph with automatic indenting (fig. 3). The `\section*{...}` and `\subsection*{...}` header commands and the relevant body text (lines: 32–34) were coded as shown (fig. 2); the starred version of these commands suppresses the generation of numbers — a style followed in ASASBE journals. Obviously in the main body text (lines: 28–34), several other features, such as tables, figures imported, figures L<sup>A</sup>T<sub>E</sub>X coded, lists, definitions, equations, etc., can be coded using appropriate commands and information to complete the article.

The back matter (lines: 36–39) generates the references listing based on the bibliography style (`\bibliographystyle{chicago}`) supplied by the publishers (`*.bst` file) and the bibliography database (`\bibliography{refs}`) created by the users (`*.bib` file). These lines will generate the reference listing automatically and it is also possible to manually code the reference items

(Igathinathane, 2011). It is advantageous to use the automatic bibliography generation, as switching the bibliography style files (`*.bst`) will automatically format the reference in the desired style yet using the user’s common master bibliography database flat-file (e.g., “`refs.bib`”). Such master bibliography database allows for “Once Write and Read Many” mode of operation.

## EXTENSION PUBLICATIONS RELATED L<sup>A</sup>T<sub>E</sub>X FEATURES

### ADVANCED FIGURES HANDLING

#### Side-by-side Figures

Figures are usually included using the float `figure` environment that also supports captions. With `subfigure` package, the subfigures (group of figures) will be declared inside the `figure` environment and arranged based on size of the figures (fig. 4). Based on the dimensions of the individual figures, the sub-figures will be grouped. If the collective dimensions can be accommodated in the current width of the text then the sub-figures will be arranged in a single row (as seen in fig. 4), otherwise in two or more rows as necessary. The optional argument of `\subfigure` command produces the sub-figure label, while supplying the default letter counter labels for identification, and these labels can be referred anywhere in the document (e.g., The command `\ref{sb}` produces: 4(b) — the main and sub-figure counters combined). The required argument of `\subfigure` command being the `\includegraphics` command with its dimensional arguments. The outer usual `figure` environment’s `\caption` command produces the overall caption of the sub-figures. The code section that produced the fig. 4 is shown herein.

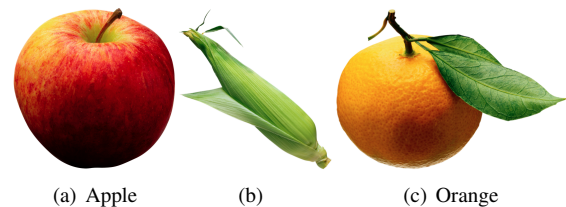


Figure 4. Subfigures illustration showing subcaptions and default labeling — (b) Corn.

```
\begin{figure}[htb]%
\centering
\subfigure[Apple]{%
\includegraphics[height=.25\linewidth]{fig-apple}}%
\subfigure[]{%
\label{sb}\includegraphics[height=.25\linewidth]{fig-corn}}%
\subfigure[Orange]{%
\includegraphics[height=.25\linewidth]{fig-orange}}%
\caption{Subfigures illustration showing subcaptions and default
labeling --- \subref{sb} Corn.}
\label{figs-fruits}
\end{figure}
```

The `subfigure` package also supports `subtable`. As observed from the code it is quite simple to handle the sub-figures and sub-tables, when the users are comfortable with handling `figure` and `table` environments in isolation.

## Wrapped Figures

Sometimes the authors want to wrap the text around the figure, although not normally followed in academic writing, and this can be achieved by `wrapfig` package. This package provides a `wrapfigure` environment and the command syntax are: `\begin{wrapfigure}[lineheight]{alignment}{width}` `\includegraphics[dimensions]{fig-file}`.

The `lineheight` option specifies the number of lines text that serves as a height placeholder, hence controlling the spaces above and below the figure, and when empty the compiler will automatically calculate this. The alignment argument takes any of the “l,r,L,R” specifiers and they refer to “left” or “right” figure placement. The mandatory `width` argument reserves the width of the placeholder for the figure placement. With the `\includegraphics` command, the other specifiers and figure input file are specified as usual. Similar to float `figure` environment, in `wrapfigure`, the caption and label can be defined as usual. The following code produced the wrapped figure (fig. 5):



Figure 5. An illustration of a wrapped figure.

```
\begin{wrapfigure}[10]{r}{0.5\linewidth}%
\centering
\includegraphics[width=0.8\linewidth]{orange}%
\caption{\label{egwrapfig}An illustration of a wrapped figure.}%
\end{wrapfigure}%
```

The other useful package is `sidecap` that supports a `\SCfigure` environment for producing longer captions that go by the side of the figure. The `SCfigure` environment is simple and the usage is similar to float `figure` environment. The package supports `SCTable` and starred versions of the environment. More information on these packages could be obtained from their respective documentation and from standard sources showing the usage (Kopka and Daly, 2004; Mittelbach et al., 2004; Wikibook Contributors, 2008).

## Background Figures

Background figures provide a canvas for the text or other elements of the document to be overlaid as the foreground. Extension publications can find applications of such background figures. An illustration of the background figures with colored text is shown in fig. 6. The package `lipsum` provided the dummy text used in the illustration.

A single background figure can cover the whole page (scaling option) or it can be tiled. The `wallpaper` package (Wilkinson, 2006) supplies all the tools to create background image and wallpapers in general. The syntax of the tiling background picture is: `\TileSquareWallPaper{number}{fig-file}`. The `number` (integer) specifies the number of tiles used along the width of the selected size of the paper. This command preserves the aspect ratio of the figure. The other commands frequently used are: `\CenterWallPaper`,



Figure 6. Background figure illustration with colored text.

`\TileWallPaper`, and `\ULCornerWallPaper` with their options. These commands once given will extend to all the following pages of the document; and the “This” versions (e.g., `\ThisTileSquareWallPaper`) apply to the current page only. Proper contrast between the background and foreground material is essential for better visibility. It is also possible to include graphics and tables in a usual manner. The fully functional code that produced the fig. 6 is given herein:

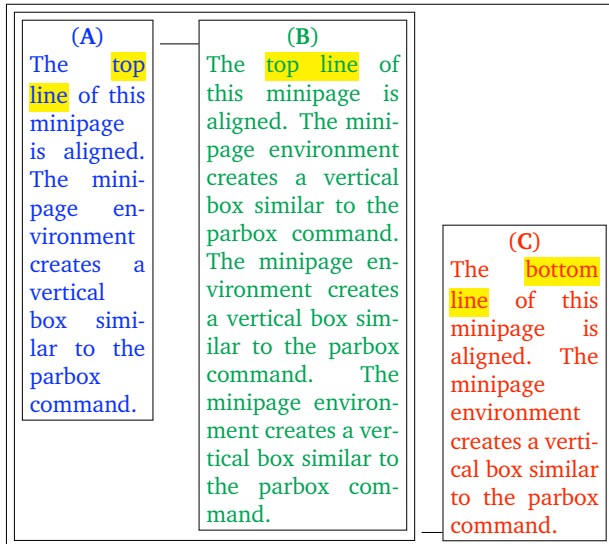
```
\documentclass[letterpaper,11pt]{article}
\usepackage{wallpaper,color,lipsum}
\usepackage[left=1in,right=1in,top=1.1in,bottom=.9in]{geometry}
\begin{document}
\ThisTileSquareWallPaper{2}{fireworks}
\color{yellow}
\title{\vspace{-.5in}\Huge\bfseries\uppercase{Stars from below}}
\author{\color{white}\Large\bfseries Allen Fisher \& M. M. Singh}
\maketitle
\color{red}\section{First Section}\lipsum[22]
\color{white}\subsection{Sub-section}\lipsum[23]
\color{green}\section{Second Section}\lipsum[51]
\color{orange}\section{Third Section}\lipsum[29]
\end{document}
```

## MINIPAGES

Minipages are vertical boxes that can hold paragraphs of text and figures. The syntax of the simplest form of `minipage` environment is: `\begin{minipage}[position:t,b,c]{width} ...text...\end{minipage}`. The command equivalent of this environment is `\parbox`. The optional position parameters namely, `t`, `b`, and `c` refer to the top, bottom, and center edge of the box with the current baseline. The width of the minipage was fixed by the width argument and the depth was variable based on the contents. Although the minipage contain paragraphs of text and figure elements, it is

treated externally as a “single character” with its own height (+ve) and depth (-ve) above and below the baseline (Kopka and Daly, 2004). Minipages can be nested and they also support footnotes.

Positioning multiple minipages vertically with different position options can be a little bit challenging. The minipages can be better visualized by enclosing the code using the `\framebox{...}` command, which will produce a box frame for the minipage output. Also, when the horizontal separation `\hfill` command replaced by `\hrulefill` will produce a horizontal rule showing the current baseline. A demonstration of vertical alignment of three minipages is given in fig. 7, and the code is given in Appendix-I.



Regular text outside minipages ...

Figure 7. Multiple minipages vertical alignment demonstration.

It can be observed from fig. 7, the minipages **A** and **B** were top-aligned and **C** was bottom-aligned. This cannot be achieved simply by using `[t,t,b]` for the position parameters, as this may result in  $-\overline{ABC}$ . While `[b,b,t]` result in  $-\underline{ABC}$ ; `[t,b,t]` result in  $-\overline{A}B\underline{C}$ ; `[b,t,b]` result in  $-\underline{A}B\underline{C}$ ; `[t,t,t]` result in  $-\overline{ABC}$ ; `[b,b,b]` result in  $-\underline{ABC}$ ; and `[c,c,c]` result in  $-\underline{ABC}$ . In all the above cases, the baseline represented by the `\hrulefill` is on the same level and the minipages having different depths were aligned with respect to this baseline; and the staggered baseline (fig. 7) can only be achieved by nesting the minipages.

Nesting of minipages and can be used to group them, provide margins, handle relative dimensions, draw frames etc. In fig. 7, a nested minipage that had **A** and **B** top aligned, and this combined page was bottom aligned with **C** to produce the desired effect. Thus, the combined minipage (**AB**) is actually a single character that was bottom-aligned with the individual minipage **C**, and all the three minipages were again nested into another minipage (Appendix-I).

Miniboxes with its text and graphical contents can be considered as fixed blocks and they can be arranged in ways (e.g., columns of unequal widths, framing blocks) that cannot be

handled using regular text. Such control is essential in the preparing newsletters, fliers, pamphlets, etc., and will be discussed subsequently.

## PRESENTATIONS

Presentations are integral part of extension publications, as most of the paper-based publications were also presented to live audience. The documentclass “beamer” is a powerful program for creating presentations as well as handouts of the same (Tantau et al., 2010). This class structure is similar to that of  $\LaTeX$  document and supports the usual  $\LaTeX$  commands. A section of four slides prepared as illustration that was created using “8 on 1” layout using `handout` option of `beamer` class is shown in fig. 8, and the complete functional code is given in Appendix-II.

The `beamer` class has several “themes” that create several styles and layout of the presentations from the same code. The illustration (fig. 8) used theme `beamerthemesplit` and a background canvas color of `red 5%`. The usual front-matter commands such as `\title`, `\author`, `\institute`, `\date`, `\logo`, etc., were similar to usual  $\LaTeX$  documents (Appendix-II). Slides are easily created by this simple syntax: `\frame{\frametitle{...title...} ...slide contents...}`. The slide contents can be any text and valid  $\LaTeX$  elements (e.g., lists, figures, tables, descriptions, etc.). The themes will automatically generate the table of contents and click-able navigation links (e.g. as seen in the top bar of fig. 8). The users with enough orientation with  $\LaTeX$  elements can easily follow the code presented in the Appendix-II and visualize how it translates into the output shown (fig. 8). The users can obtain several presentation styles and templates from various open source materials created by developer-users freely available in internet.

## POSTERS

Posters as a form of formal presentation aid have gained wide popularity and became a standard feature in conferences and technical meetings. The documentclass “beamer” can be again used to create professional quality poster, which inherits all the powerful features of  $\LaTeX$  document preparation. The package `beamerposter` allows the usage of color box handling and alignment in the `beamer` class (Dreuw, 2008). This package defines several poster sizes (e.g., DIN A0, DIN A1, DIN A2, DIN A3, DIN A4) and landscape or portrait orientation. An example of `beamer` class `beamerposter` package coded output of a poster with dummy text as well as showing mathematical equations, table and graphic elements is presented in fig. 9. The complete functional code of the poster document is given in Appendix-III. This poster uses the theme `beamerthemeNDSUposter.sty` developed by the author based on the theme `beamerthemeI6dv.sty` (Dreuw, 2010) created by David Vilar (<http://www-i6.informatik.rwth-aachen.de/~vilar/index.html>).

Studying the layout of poster elements and understanding the logic makes it easy to code the poster (Appendix-III). The entire poster can be considered as a single slide of the `beamer` presentation; thus a single `frame` environment can create the

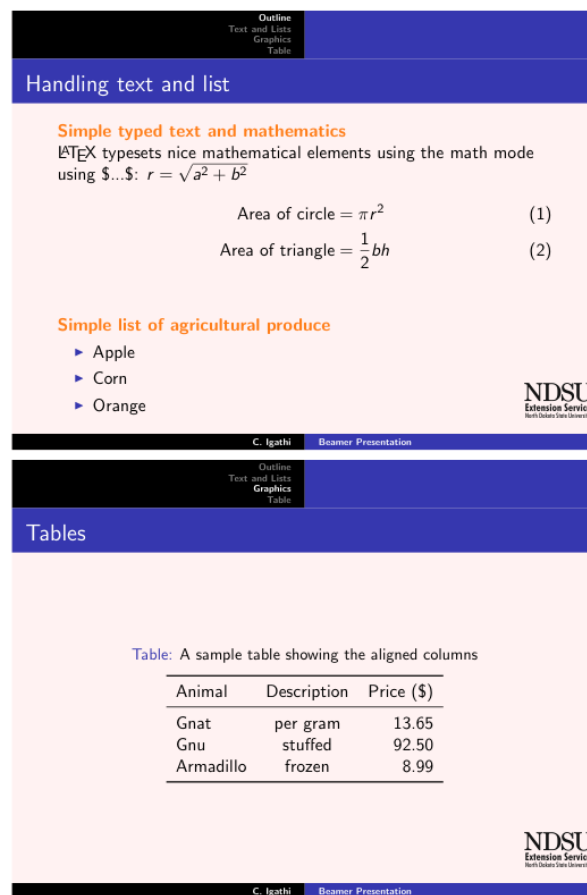


Figure 8. Beamer class oral presentation slides illustration.

poster along with the top (title), middle (poster area), and bottom (footnote) frames (fig. 9). Overall the middle frame contains three columns top-aligned coded in a `columns` environment with `[t]`. Individual columns are coded as `column` environment with their width specified. The user decides the number and width of each column (equal or unequal) to be used in the poster based on the total width available using the dimension command `\linewidth`. To produce column separation gaps, the sum of the widths of all columns should be less than the total width available. Within columns the contents (text, mathematical element, table, and figure) were coded using `block` environment with titles. Blocks can have `columns` and in turn have `column` environments (equal or unequal widths) as seen, for example, in the block titled “Background” of the first column (fig. 9). Each block was separated by a `\vspace` or equivalent command, which can also be used to create blank space below the contents within the block. Within a column, the blocks can be arranged side-by-side as shown in the third column second level (fig. 9). This can be coded by a nested `columns` environment, under the main `column` environment (3<sup>rd</sup> poster column), with top-alignment, having two nested `column` environments (unequal width) and each having the `block` environment (Appendix-III). The blank space below the text of the block titled “Sub-block 2 of 2” was created by the command `\vspace{9.25ex}`.

The footnote frame gets populated from the codes present in the `beamerthemeNDSUposter.sty` using the short version inputs (within square brackets) of the `\author`, `\institute`, and `\date` commands (e.g., `\insertshortauthor`). As seen from the poster (fig. 9) and the code (Appendix-III) it is possible to incorporate colored text, mathematical equations, table, and figures. To balance the columns at the bottom (the top was already automatically aligned from the columns ‘t’ option), `\vspace` commands with proper dimensions were issued, and  $\LaTeX$  allows for even very minute adjustments ( $0.00536 \mu\text{m}$ ). The final output is a high-quality pdf file that can be printed on plotters for display. Following the outlined framework (Appendix-III) and the knowledge of  $\LaTeX$ , the users can easily create posters suiting their requirements.

## NEWSLETTERS

Newsletters, news columns, or short publications are regularly run material, in print and electronic forms, by the extension professionals. These publications are characterized by unconventional formats and collection of various materials to catch the visual attention and engage the readers, unlike standard format of professional journals.  $\LaTeX$  can be used to create these publications as well as newspapers using appropriate classes and packages. A sample newsletter created from scratch using  $\LaTeX$  commands and elements with some



# BEAMER Class with "beamerposter" Package for Poster Preparation in L<sup>A</sup>T<sub>E</sub>X

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Agricultural and Biosystems Engineering, North Dakota State University, Fargo, USA; NGRPL, USDA-ARS, Mandan, USA

### Introduction

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa. Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisi. Vivamus quis tortor vitae risus porta vehicula.

### Theoretical consideration

One way of producing mathematical equations is using `align` environment as shown:

$$z = a + b \quad (1)$$
$$r = \sqrt{x^2 + y^2} \quad (2)$$
$$A = \pi r^2 \quad (3)$$

Nunc euismod, mauris luctus adipiscing pellentesque, augue ligula pellentesque lectus, vitae posuere purus velit a pede. Phasellus leo mi, egestas imperdiet, blandit non, sollicitudin pharetra, enim. Nullam faucibus tellus non enim.

### Results and Discussion: Tables

Nunc euismod, mauris luctus adipiscing pellentesque, augue ligula pellentesque lectus, vitae posuere purus velit a pede. Phasellus leo mi, egestas imperdiet, blandit non, sollicitudin pharetra, enim. Nullam faucibus tellus non enim.

Table: A sample table showing the aligned columns

Animal	Description	Price (\$)
Gnat	per gram	13.65
Gnu	stuffed	92.50
Tiger	stuffed	290.00
Lion	stuffed	350.50
Armadillo	frozen	8.99

Donec vel nibh ut felis consectetur laoreet. Donec pede. Sed id quam id wisi laoreet suscipit. Nulla lectus dolor, aliquam ac, fringilla eget, mollis ut, orci. In pellentesque justo in ligula. Maecenas turpis. Donec eleifend leo at felis tincidunt consequat. Aenean turpis metus, malesuada sed, condimentum sit amet, auctor a, wisi. Pellentesque sapien elit, bibendum ac, posuere et, congue eu, felis. Vestibulum mattis libero quis metus scelerisque ultrices. Sed purus.

### Results and Discussion: Graphics




Figure: Fruits and corn

Nunc euismod, mauris luctus adipiscing pellentesque, augue ligula pellentesque lectus, vitae posuere purus velit a pede. Phasellus leo mi, egestas imperdiet, blandit non, sollicitudin pharetra, enim. Nullam faucibus tellus non enim.

### Sub-block 1 of 2

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisi. Vivamus quis tortor vitae risus porta vehicula.

### Sub-block 2 of 2

Nunc euismod, mauris luctus adipiscing pellentesque, augue ligula pellentesque lectus, vitae posuere purus velit a pede. Phasellus leo mi, egestas imperdiet, blandit non, sollicitudin pharetra, enim. Nullam faucibus tellus non enim.

### Conclusion

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisi. Vivamus quis tortor vitae risus porta vehicula.

### Acknowledgments

Nunc euismod, mauris luctus adipiscing pellentesque, augue ligula pellentesque lectus, vitae posuere purus velit a pede. Phasellus leo mi, egestas imperdiet, blandit non, sollicitudin pharetra, enim. Nullam faucibus tellus non enim.

### Background

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

### Experimental Setup

Nunc euismod, mauris luctus adipiscing pellentesque, augue ligula pellentesque lectus, vitae posuere purus velit a pede. Phasellus leo mi, egestas imperdiet, blandit non, sollicitudin pharetra, enim. Nullam faucibus tellus non enim.

### Background

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

### Background

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

### Background

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Figure 9. Beamer class beamerposter package poster illustration.

repeating texts and figures is shown in fig. 10, and the complete functional code is presented in Appendix-IV.

This newsletter is based on the basic `article` class and it predominantly used the `minipage` environments to compose the page. The layout is essentially composed of a title block figure, a full-width minipage for running title, a narrow-width ( $\approx 0.2$ ) left minipage, and a wide-width (0.75) right combined minipage that had several nested minipages (Appendix-IV). On the top level of right combined minipage two side-by-side minipages were arranged; on the middle level a full-width (relative to the current minipage) minipage with `wrapfigure` environment was coded; and on the final bottom level a full-width minipage using `multicols` environment (3 columns selected) that automatically produced the equal-width columns (compare with the top level where columns generated by nested minipages). Appropriate use of `\includegraphics` command and `\captionof` command of `capt-of` package made it possible to incorporate the figures in `multicols` environment. Frame box and footnote features were also used in the code. Additional materials will be coded in the subsequent pages of the newsletter.

A similar but more sophisticated newsletter code, which this newsletter output was loosely based, was found elsewhere (Anonymous, 2003). The `paperTeX` class (Llopis, 2010) that is meant creating newspapers could also be used to typeset shorter newsletters. It is also possible to create high-quality newsletters with relative ease by coding them as "posters" using the `beamer` class discussed earlier. The only difference is the dimension of the document canvas, and which can be al-

## Ag Extension Newsletter

### Fruits - The Important Part of Food Pyramid

#### In This Issue:

The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned. The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned. The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned. The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned.

#### Food Pyramid

The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned.




Fig. 2: Food pyramid

#### Vitamin C Rich Fruit




Fig. 3: Orange

The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned. The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned.

#### Pineapple and Melon Growers




Fig. 4: Fruits

The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned. The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned.

#### Multicolumn Heading Spanning the Columns

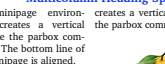


Fig. 5: Apple




Fig. 7: Fruits reflected

The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned. The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned. The minipage environment creates a vertical box like the parbox command. The bottom line of this minipage is aligned.

Contact: C. Igathinathane, ABEN, NDSU, email: [Igathinathane.Cannayen@ndsu.edu](mailto:Igathinathane.Cannayen@ndsu.edu)

Figure 10. A small L<sup>A</sup>T<sub>E</sub>X document source code and its pdf output.

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tered by appropriate settings.

By advanced programming, it is also possible to create `class` and companion `template` files for any style of document, which will lessen the coding effort from the users and quality outputs can be generated with ease. Such class and template development activities are best left to the professionals; however with working knowledge of  $\LaTeX$  and the various aspects discussed in this article, the extension professionals, faculty, and students could be able to master the required coding and produce high-quality documents of various types only using the free resources, as demonstrated in the article. The developed codes can be easily shared and others can benefit from them. It should be noted that the capability of  $\LaTeX$  and other packages is practically unlimited; and any desired formats and automation required for document preparation could be created using the available resources.

## CONCLUSIONS

The agricultural extension professionals and those involved in extension related activities can consider  $\LaTeX$ , a free and high-quality documentation preparation system, as an additional tool for their variety of extension publication needs. Content- and color-rich extension publications, such as documents with background figures, presentation slides, conference posters, newsletter as well as regular peer-reviewed journal style articles can be created using  $\LaTeX$  codes with appropriate class and packages as demonstrated.  $\LaTeX$  empowers the extension professionals with the capability of creating their own documents of professional quality from start to finish, mostly they were not used to so far, thus saving time and cost that were usually involved document preparation process. Tighter time schedule and limited extension publication budget makes  $\LaTeX$  an attractive choice to the agricultural extension professionals, researchers, students, and general users. As extension professionals continue to use  $\LaTeX$ , they can master the nuances and could be able to create sophisticated documents, automate several aspects of document preparation, and able to make templates that are easy to work with. Although there is some learning involved while using  $\LaTeX$ , the benefits could outweigh the effort. Impact of the message through extension publications is ensured through the timeliness and professional quality output, due to bypassing typesetting personnel and directly creating the final draft and producing output quality matching or surpassing existing systems.

## ACKNOWLEDGMENTS

The Northern Great Plains Research Laboratory (NGPRL), USDA-ARS, Mandan, ND, USA has provided the facilities and this support was gratefully acknowledged.

### NOTE ON THE ACCESS TO DEVELOPED CODES

The readers can obtain the class file - `asabe.cls` (fig. 2 and fig. 3) and the theme file - `beamerthemeNDSUposter.sty` (Appendix-III) from the first author through email

<Igathinathane.Cannayen@ndsu.edu>. These files will be later posted on the department's personnel web pages. These files were used to create some of the outputs discussed in this article. The readers should substitute their sample figure files in the `\includegraphics` commands argument on the codes in the sections and appendices to make the code functional, as the exact figure served only the purpose of concept demonstration.

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```

}
\\ \mbox{}% making the next line as the reference line
\end{minipage}% Inner combined
}
\hrulefill
\framebox{\begin{minipage}[b]{0.25\linewidth}% Inner red (C)
\textcolor{red}{\centering(\textbf{C})}\ The \hl{bottom line} of
this minipage is aligned. \reptext}
\end{minipage}% Inner red
}
\end{minipage}% Outer
}
\\[2pt]Regular text outside minipages \ldots
%-----

```

## APPENDIX-II

### Code of the beamer presentation slides

```

%-----
\documentclass{beamer}
\usepackage{beamerthemesplit}\usepackage{graphicx,hyperref,booktabs}

\setbeamercolor{background canvas}{bg=red!5}
\newcommand\stitle[1]{\bfseries\textcolor{orange}{#1}}
\title[Beamer Presentation]{Presentation}
Using ‘‘beamerthemesplit’’ Package
\subtitle{-Subtitle goes here-}
\author[C. Igathi]{Igathinathane Cannayan}
\institute[ABEN, NDSU]{Agricultural and Biosystems Engineering, NDSU}
\date{\today}
\logo{\includegraphics[width=0.14\linewidth]{extension_logo.pdf}}

\begin{document}
\frame{\titlepage}

\section{Outline}
\frame{\frametitle{Outline of Topics}\tableofcontents}

\frame{\frametitle{Handling text and list}
\section{Text and Lists}
\subsection[Text]{Typed text}
\stitle{Simple typed text and mathematics}}
{LaTeX typesets nice mathematical elements using the math mode
using \$....\$: $r = \sqrt{a^2+b^2}$
\begin{align}
\mbox{Area of circle} &= \pi r^2\backslash
\mbox{Area of triangle} &= \frac{1}{2}bh
\end{align}
}\[4ex]
\subsection[list]{Simple list}
\stitle{Simple list of agricultural produce}
\begin{itemize}
\item Apple \item Corn \item Orange
\end{itemize}}

\section{Graphics}
\frame{\frametitle{Including Graphics}
Pictures are included using the \textbf{figure} environment
in the usual manner.
\begin{figure}
\includegraphics[width=.5\linewidth]{fruits} \caption{Fruits}
\end{figure}}

\section{Table}
\frame{\frametitle{Tables}
\begin{table}
\centering\caption{A sample table showing the aligned columns}
\begin{tabular}{lcr}
\toprule Animal & Description & Price (\$)\backslash \midrule
Gnat & per gram & 13.65 \\
Gnu & stuffed & 92.50 \\
Armadillo & frozen & 8.99 \\
\bottomrule
\end{tabular}
\end{table}}
\end{document}
%-----

```

## APPENDIX-I

### Code of the minipage demonstration

```

%-----
%Packages to be used are \vb{soul}, and \vb{usenames,dvipsnames}
%\xcolor} among others. The \vbc{reptext} command the repeating
%text shortcut that produces the text used in (fig. 7), and the
%users can substitute their text in its place.
%-----
\noindent
\framebox{\begin{minipage}[t]{0.97\linewidth}% Outer
\framebox{\begin{minipage}[b]{0.65\linewidth}% Inner combined
\framebox{\begin{minipage}[t]{0.3\linewidth}% Inner-inner blue (A)
\textcolor{blue}{\centering(\textbf{A})}\ The \hl{top line} of
this minipage is aligned. \reptext}
\end{minipage}% Inner-inner blue
}
\hrulefill
\framebox{\begin{minipage}[t]{0.5\linewidth}% Inner-inner green (B)
\textcolor{Green}{\centering(\textbf{B})}\ The \hl{top line} of
this minipage is aligned. \reptext\reptext\reptext}
\end{minipage}% Inner-inner green

```

# APPENDIX-III

## Code of the beamer poster

```

%-----
\documentclass[final,t]{beamer}
\mode<presentation>{\usetheme{NDSUposter}}

\usepackage[orientation=landscape,size=custom,width=200,height=120,
scale=1.9]{beamerposter}\usepackage[lipsum,booktabs,capt-of]
\usepackage{times,amsmath,amsthm,amssymb,latexsym}
\newcommand\stext{Nunc euismod, mauris luctus adipiscing
pellentesque, auge ligula pellentesque lectus, vitae posuere purus
velit a pede. Phasellus leo mi, egestas imperdiet, blandit non,
sollicitudin pharetra, enim. Nullam faucibus tellus non enim.}

\title{\huge BEAMER Class with "beamerposter" Package for Poster
Preparation in \LaTeX}
\author{Igathinathane et al.}{C.~Igathinathane, \, K.~Hellavang, \,
C.~Thorson, \, T.~Faller, \, L.~Backer}
\institute{ABEM, NDSU, Fargo, USA; NGRPRL, USDA-ARS, Mandan, USA}
\Agricultural and Biosystems Engineering, North Dakota State
University, Fargo, USA; NGRPRL, USDA-ARS, Mandan, USA}
\date{\mbox{Email: Igathinathane.Cannayen@ndsu.edu}; \today}\today}
%-----
\begin{document}
\begin{frame}{}%Overall
\begin{columns}[t]%Combined-3
%-----
\begin{column}{.3\linewidth}%1
\begin{block}{Introduction} \lipsum[3-4]
\end{block}\vspace{0.5ex}
\begin{block}{Background}
\begin{columns}[T]
\begin{column}{.49\linewidth}\textcolor{blue}{\lipsum[3]}
\end{column}
\begin{column}{.49\linewidth}\textcolor{red}{\lipsum[3]}
\end{column}
\end{columns}
\end{block}\vspace{0.5ex}
\begin{block}{Experimental Setup}
\begin{columns}[t]
\begin{column}{.75\linewidth}\stext
\end{column}
\begin{column}{.25\linewidth}
\end{column}
\end{columns}
\end{block}
\end{column}%1
%-----
\begin{column}{.3\linewidth}%2
\begin{block}{Theoretical consideration}
\begin{columns}[t]
\begin{column}{.5\linewidth}
One way of producing mathematical equations is using
\textbf{align} environment as shown:
\begin{align}
z &= a + b \\
r &= \sqrt{x^2 + y^2} \\
A &= \pi r^2
\end{align}\stext
\end{column}
\begin{column}{.4\linewidth}\stext\stext
\end{column}
\end{columns}
\end{block}
\begin{block}{Results and Discussion: Tables}
\begin{columns}[T]
\begin{column}{.35\linewidth}\stext\stext
\end{column}
\begin{column}{.65\linewidth}
\begin{table}
\centering\caption{A sample table showing the aligned columns}
\vskip2ex
\begin{tabular}{l @{\hspace{0.2\linewidth}} p{0.3\linewidth}r}
\toprule Animal & Description & Price (\$) \\ \midrule
Gnat & per gram & 13.65 \\
Gnu & stuffed & 92.50 \\
Tiger & stuffed & 290.00 \\
Lion & stuffed & 350.50 \\
Armadillo & frozen & 8.99 \\ \bottomrule
\end{tabular}
\end{column}
\end{columns}
\end{block}
\end{column}
\end{frame}

```

```

\vskip2ex
\begin{columns}[T]
\begin{column}{.35\linewidth}\textcolor{green}{\stext}
\end{column}
\begin{column}{.65\linewidth}\textcolor{cyan}{\lipsum[27]}
\end{column}
\end{columns}
\end{block}
\end{column}%2
%-----
\begin{column}{.3\linewidth}%#3
\begin{block}{Results and Discussion: Graphics}
\centering
\includegraphics[height=0.2\linewidth]{apple}%
\includegraphics[height=0.2\linewidth]{corn}%
\includegraphics[height=0.2\linewidth]{orange}%
\captionof{figure}{Fruits and corn}\stext
\end{block}
\begin{columns}[t]
\begin{column}{.57\linewidth}
\begin{block}{Sub-block 1 of 2} \lipsum[4]
\end{block}
\end{column}
\begin{column}{.4\linewidth}
\begin{block}{Sub-block 2 of 2}\stext\vspace{9.25ex}
\end{block}
\end{column}
\end{columns}\vspace{2ex}
\begin{block}{Conclusion}\lipsum[4]\stext
\end{block}\vspace{2.5ex}
\begin{block}{Acknowledgments}
\centering \includegraphics[height=0.1\linewidth]{ndsulogo}
\hspace{0.1\linewidth}
\includegraphics[height=0.1\linewidth]{usdaarslogo}
\end{block}
\end{column}%#3
%-----
\end{columns}%Combined-3
\end{frame}%Overall
\end{document}
%-----

```

# APPENDIX-IV

## Code of the newsletter demonstration

```

%-----
\documentclass[11pt]{article}
%-----
\usepackage{graphicx,xspace,capt-of,wrapfig,multicol,charter}
\usepackage{usenames,dvipsnames,table}{xcolor}
\usepackage{colorlinks,urlcolor=blue}{hyperref}
%-----
\textwidth = 7 in \textheight = 10.5 in
\oddsidemargin = 0pt \evensidemargin = 0pt
\topmargin = -36pt \headheight = 0pt \headsep = 0pt \parskip = 4pt
\parindent = 0.0in \marginparwidth = 0pt \marginparsep = 0pt
\hoffset=-18pt \pagestyle{empty}
\renewcommand{\figurename}{\small\bfseries\itshape Fig.}
\newcommand{\upcapf}[1]{\vspace{-2ex}\captionof{figure}{#1}}
\newcommand{\upcpt}[1]{\vspace{-2ex}\captionof{table}{#1}}
\newcommand\sones{The minipage environment creates a vertical
box like the parbox command.\xspace}
\newcommand\stwo{The bottom line of this minipage is aligned.\xspace}
\definecolor{NDSUgreen}{RGB}{0,87,61}
\definecolor{NDSUYellow}{RGB}{255,196,35}
%-----
\begin{document}
\includegraphics[width=\linewidth]{titleblockblack}
\centering\colorbox{NDSUgreen}{\textcolor{NDSUYellow}{\huge\bfseries
\begin{minipage}[c]{4ex}{0.98\linewidth}
\centering Fruits - The Important Part of Food Pyramid
\end{minipage}}}}
\framebox{% Frame left (FL)
\begin{minipage}[t]{0.188\linewidth}{\bfseries In This Issue:}\[3pt]
\rule{\linewidth}{3pt}\[3pt]
\textcolor{OrangeRed}{\sones\stwo\sones\stwo\sones}
\begin{center}\vspace{1.4ex}
\includegraphics[width=.6\linewidth,angle=-45]{fruits}
\textcolor{black}{\upcapf{Fruits rotated}}
\end{center}

```

```

\stwo\sone\stwo\stwo\sone}
\end{minipage}
}\hfill %(FL)
\framebox{% Frame combined right (FCR)
\begin{minipage}[t]{0.75\linewidth}% Right combined (RC)
\begin{minipage}[t]{0.45\linewidth}% Right top left (RTL)
\textcolor{blue}{\large\bfseries Food Pyramid}\}
\sone\stwo\par\centering
\includegraphics[width=.8\linewidth]{foodpyramid}
\upcapf{Food pyramid} \label{fig1}
\end{minipage}% (RTL)
\hfill
\begin{minipage}[t]{0.45\linewidth}% Right top right (RTR)
\textcolor{blue}{\large\bfseries Vitamin C Rich Fruit}\}
\mbox{}[-3ex]
\vspace{-3ex}
\begin{center}
\includegraphics[width=.5\linewidth]{orange}
\upcapf{Orange} \label{fig2}
\end{center}\vspace{-1ex}
\small \sone\stwo\sone\stwo\sone
\end{minipage}% (RTR)

\parskip = 1ex
\begin{minipage}[t]{.96\linewidth}% Right mid full (RMF)
\textcolor{blue}{\centering\large\bfseries Pineapple
and Melon Growers \}
\small \sone % Textcolor to be given again
\begin{wrapfigure}{r}{0pt}
\centering
\includegraphics[width=.18\linewidth]{fruits}
\upcapf{Fruits} \label{fig3}
\end{wrapfigure}

```

```

The some bottom is always in the same line
of this minipage is aligned.
\sone\sone\sone\stwo\sone\stwo\sone\stwo\stwo
\end{minipage}% (RMF)

\parskip = 2ex
\begin{minipage}[t]{.96\linewidth}% Right bottom full (RBF)
\textcolor{blue}{\centering\large\bfseries Multicolumn
Heading Spanning the Columns\[-2ex]}
\begin{multicols}{3}
\small \sone\stwo
\begin{center}
\includegraphics[width=.3\linewidth]{apple}
\upcapf{Apple} \label{fig4}
\end{center} \vspace{-1ex}\stwo\sone
\begin{center}
\reflectbox{\includegraphics[width=.5\linewidth]{orange}}
\upcapf{Orange reflected} \label{fig5}
\end{center} \vspace{-1ex}\stwo\sone
\begin{center}
\reflectbox{\includegraphics[width=.52\linewidth]{fruits}}
\upcapf{Fruits reflected} \label{fig6}
\end{center}\vspace{-1ex}\stwo\sone
\footnotetext{\hspace{-4ex}
\textsf{Contact: C. Igathinathane, ABEN, NDSU; email:
\href{mailto:Igathinathane.Cannayen@ndsu.edu}
{Igathinathane.Cannayen@ndsu.edu}}}
\end{multicols}
\end{minipage}% (RBF)
}% (FCR)
\end{document}
%-----

```