Farmer field schools: a systematic review

Hugh Waddington, Birte Snilstveit, Jorge Hombrados, Martina Vojtkova, Daniel Phillips and Howard White
What are FFSs?
Global reach of FFS
“....remarkable, widespread and lasting developmental impacts” (Van den Berg 2004)

“....no significant impacts on the performance of graduates and their neighbours” (Feder et al. 2004)
Results
Effectiveness Synthesis

Title Screening criteria:
Developing country
FFS
Primary research

Abstract screening criteria:
Developing country
FFS
Primary research
Quantitative Impact Evaluation (IE)

Fulltext inclusion criteria:
FFS
Primary research
Quantitative IE
Study design

27,866 titles screened
1453 abstracts screened
958 excluded
126 no access
369 full text screened
231 excluded:
177 on relevance
58 on design
80 FFS impact evaluation studies
(134 papers)

Qualitative Synthesis

Title Screening criteria:
Developing country
FFS
Primary research

Abstract screening criteria:
Developing country
FFS
Primary research

Fulltext inclusion criteria:
FFS
Primary research
Qualitative or descriptive studies
Barriers/facilitators
Methods reporting

20 qualitative studies
(27 papers)

QUANTITATIVE SYNTHESIS

1,112 abstracts screened
751 excluded
49 unavailable
314 full text screened
257 excluded:
124 excl on methodology
128 excl on relevance
5 excl as duplicates

27,866 titles screened
1,112 abstracts screened
751 excluded
49 unavailable
314 full text screened
257 excluded:
124 excl on methodology
128 excl on relevance
5 excl as duplicates

20 qualitative studies
(27 papers)

QUALITATIVE SYNTHESIS
Knowledge acquisition: FFS participants acquire knowledge and skills, improved analytical decision-making

Adoption: FFS participants adopt new technology and management practices

Diffusion of knowledge (to non-participants, communication or observation)

Diffusion of practices (neighboring farmers adopt new technology and management practices)

Final outcomes: Yield, input-output ratio, income, health, environment, empowerment

Other inputs: Financial resources, inputs, physical set-up

Training of facilitators: Season long training of facilitators

FFS training provided to farmers: season long training using participatory, discovery-based learning approach; including agro-ecosystem analysis and use of experimental plots, delivery of curriculum which has been partially determined by farmers

Final outcomes: Yield, input-output ratio, income, health, environment, empowerment
### Knowledge of ‘improved’ farming practices

<table>
<thead>
<tr>
<th>Study</th>
<th>ID</th>
<th>ES (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FFS participants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Huan et al., 1999 (Vietnam)</td>
<td></td>
<td>0.02 (-0.06, 0.10)</td>
</tr>
<tr>
<td>Endalew, 2009 (Ethiopia)</td>
<td></td>
<td>0.27 (-0.06, 0.60)</td>
</tr>
<tr>
<td>Price et al., 2001 (Philippines)</td>
<td></td>
<td>0.42 (-0.17, 1.01)</td>
</tr>
<tr>
<td>Rao et al., 2012 (India)</td>
<td></td>
<td>0.43 (-0.02, 0.87)</td>
</tr>
<tr>
<td>Reddy &amp; Suryamani, 2005 (India)</td>
<td></td>
<td>0.45 (-0.04, 0.94)</td>
</tr>
<tr>
<td>Mutandwa &amp; Mpangwa, 2004 (Zimbabwe)</td>
<td></td>
<td>0.59 (0.25, 0.92)</td>
</tr>
<tr>
<td>Dinpanah et al., 2010 (Iran)</td>
<td></td>
<td>0.67 (0.41, 0.92)</td>
</tr>
<tr>
<td>Khan et al., 2007 (Pakistan)</td>
<td></td>
<td>0.79 (0.29, 1.29)</td>
</tr>
<tr>
<td>Bunyatta et al., 2006 (Kenya)</td>
<td></td>
<td>1.03 (0.65, 1.41)</td>
</tr>
<tr>
<td>Erbaugh, 2010 (Uganda)</td>
<td></td>
<td>1.14 (0.93, 1.34)</td>
</tr>
<tr>
<td>Rebaudo &amp; Dangles, 2011 (Ecuador)</td>
<td></td>
<td>1.79 (1.17, 2.41)</td>
</tr>
<tr>
<td>Subtotal (I-squared = 93.9%, p = 0.000)</td>
<td></td>
<td>0.67 (0.33, 1.02)</td>
</tr>
<tr>
<td><strong>FFS neighbours</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khan et al., 2007 (Pakistan)</td>
<td></td>
<td>-0.13 (-0.68, 0.42)</td>
</tr>
<tr>
<td>Reddy &amp; Suryamani, 2005 (India)</td>
<td></td>
<td>0.05 (-0.45, 0.56)</td>
</tr>
<tr>
<td>Ricker-Gilbert et al, 2008 (Bangladesh)</td>
<td></td>
<td>0.17 (-0.25, 0.59)</td>
</tr>
<tr>
<td>Rebaudo &amp; Dangles, 2011 (Ecuador)</td>
<td></td>
<td>0.38 (-0.15, 0.91)</td>
</tr>
<tr>
<td>Subtotal (I-squared = 0.0%, p = 0.610)</td>
<td></td>
<td>0.13 (-0.12, 0.37)</td>
</tr>
</tbody>
</table>

**NOTE:** Weights are from random effects analysis
Barriers and facilitators of knowledge
**Training of facilitators:**
Season long training of facilitators

**Other inputs:**
Financial resources, inputs, physical set-up

**FFS training provided to farmers:**
Season long training using participatory, discovery-based learning approach; including agro-ecosystem analysis and use of experimental plots, delivery of curriculum which has been partially determined by farmers

**Knowledge acquisition:**
FFS participants acquire knowledge and skills, improved analytical decision-making

**Adoption:**
FFS participants adopt new technology and management practices

**Diffusion of knowledge**
(to non-participants, communication or observation)

**Diffusion of practices**
(neighboring farmers adopt new technology and management practices)

**Final outcomes:**
Yield, input-output ratio, income, health, environment, empowerment

**Knowledge acquisition:**
FFS participants acquire knowledge and skills, improved analytical decision-making

**Adoption:**
FFS participants adopt new technology and management practices

**Diffusion of knowledge**
(to non-participants, communication or observation)

**Diffusion of practices**
(neighboring farmers adopt new technology and management practices)

**Final outcomes:**
Yield, input-output ratio, income, health, environment, empowerment
Pesticide demand reduced among participants (IPM/IPPM)

**Study**

- **FFS participants**
  - Yamazaki & Resosudarmo, 2007 (Indonesia)
  - Birthal et al., 2000 (India)
  - Yang et al., 2005 (China)
  - Yorobe & Rejesus, 2011 (Philippines)
  - Yang et al., 2005 (China)
  - Khan et al., 2007 (Pakistan)
  - Khalid, n.d. (Sudan)
  - Rejesus et al, 2010 (Vietnam)
  - Pananurak, 2010 (India)
  - Mutandwa & Mpangwa, 2004 (Zimbabwe)
  - Amera, 2008 (Kenya)
  - Pananurak, 2010 (Pakistan)
  - Mancini et al., 2008 (India)
  - Wu Lifeng, 2010 (China)
  - Khan et al., 2007 (Pakistan)
  - Feder et al, 2004 (Indonesia)
  - Cavatassi et al., 2011 (Ecuador)
  - Friis-Hansen et al., 2004 (Uganda)

- **FFS neighbours**
  - Pananurak, 2010 (India)
  - Khan et al., 2007 (Pakistan)
  - Yamazaki & Resosudarmo, 2007 (Indonesia)
  - Wu Lifeng, 2010 (China)
  - Labarta, 2005 (Nicaragua)
  - Feder et al, 2004 (Indonesia)
  - Praneetvatakul & Waibel, 2006 (Thailand)
  - Van den Berg et al., 2002 (Sri Lanka)
  - Cavatassi et al., 2011 (Ecuador)
  - Friis-Hansen et al., 2004 (Uganda)

**ES (95% CI)**

- **FFS participants**
  - 0.20 (0.01, 3.23)
  - 0.21 (0.17, 0.26)
  - 0.32 (0.21, 0.48)
  - 0.37 (0.18, 0.78)
  - 0.41 (0.36, 0.46)
  - 0.46 (0.39, 0.54)
  - 0.48 (0.31, 0.75)
  - 0.52 (0.24, 1.12)
  - 0.52 (0.30, 0.92)
  - 0.57 (0.36, 0.89)
  - 0.59 (0.41, 0.87)
  - 0.61 (0.52, 0.71)
  - 0.65 (0.50, 0.84)
  - 0.67 (0.46, 0.97)
  - 0.71 (0.64, 0.80)
  - 0.72 (0.62, 0.84)
  - 0.82 (0.74, 0.90)
  - 0.82 (0.68, 0.98)
  - 0.83 (0.75, 0.93)
  - 0.88 (0.68, 1.13)
  - 0.90 (0.75, 1.09)
  - 0.91 (0.28, 2.94)
  - 0.95 (0.39, 2.34)
  - 1.30 (1.08, 1.57)
  - 1.34 (0.99, 1.80)
  - 1.42 (1.09, 1.86)
  - 0.66 (0.56, 0.78)

- **FFS neighbours**
  - 0.54 (0.25, 1.15)
  - 0.61 (0.51, 0.74)
  - 0.67 (0.12, 3.88)
  - 0.68 (0.62, 0.76)
  - 0.78 (0.40, 1.49)
  - 0.99 (0.42, 2.33)
  - 1.11 (0.69, 1.79)
  - 1.15 (0.92, 1.43)
  - 1.20 (0.40, 3.53)
  - 1.30 (1.09, 1.55)
  - 0.88 (0.68, 1.14)

**NOTE**: Weights are from random effects analysis.
Barriers and facilitators to adoption
**Training of facilitators:**
Season long training of facilitators

**Other inputs:** Financial resources, inputs, physical set-up

**FFS training provided to farmers:**
Season long training using participatory, discovery-based learning approach; including agro-ecosystem analysis and use of experimental plots, delivery of curriculum which has been partially determined by farmers

**Knowledge acquisition:**
FFS participants acquire knowledge and skills, improved analytical decision-making

**Adoption:**
FFS participants adopt new technology and management practices

**Diffusion of knowledge**
(to non-participants, communication or observation)

**Diffusion of practices**
(neighboring farmers adopt new technology and management practices)

**Final outcomes:**
Yield, input-output ratio, income, health, environment, empowerment

**Final outcomes:**
Yield, input-output ratio, income, health, environment, empowerment
### Yields improve among participants

![Diagram showing the improvement in yields among participants with intervention.](image)

The figure illustrates the improvement in yields among participants with intervention. The data points are marked with green circles, indicating a significant positive effect. The x-axis represents the scale of favoring intervention, ranging from 0.5 to 3. The y-axis shows the yield improvements with corresponding 95% confidence intervals. The yields improve among participants with intervention, as indicated by the ES (95% CI) values listed below.

<table>
<thead>
<tr>
<th>Study</th>
<th>ES (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFS participants</td>
<td></td>
</tr>
<tr>
<td>Pananurak, 2010 (India)</td>
<td>0.80 (0.61, 1.05)</td>
</tr>
<tr>
<td>Van Rijn, 2010 (Peru)</td>
<td>0.86 (0.63, 1.18)</td>
</tr>
<tr>
<td>Naik et al., 2008 (India)</td>
<td>0.89 (0.83, 0.96)</td>
</tr>
<tr>
<td>Huan et al., 1999 (Vietnam)</td>
<td>0.95 (0.92, 0.98)</td>
</tr>
<tr>
<td>Labarta, 2005 (Nicaragua)</td>
<td>0.97 (0.92, 1.02)</td>
</tr>
<tr>
<td>Rejesus et al, 2010 (Vietnam)</td>
<td>0.97 (0.72, 1.31)</td>
</tr>
<tr>
<td>Feder et al, 2004 (Indonesia)</td>
<td>0.98 (0.96, 1.01)</td>
</tr>
<tr>
<td>Wu Lifeng, 2010 (China)</td>
<td>1.01 (1.03, 1.14)</td>
</tr>
<tr>
<td>Ali &amp; Sharif, 2011 (Pakistan)</td>
<td>1.09 (1.03, 1.15)</td>
</tr>
<tr>
<td>Pananurak, 2010 (China)</td>
<td>1.09 (1.04, 1.14)</td>
</tr>
<tr>
<td>Van Rijn, 2010 (Peru)</td>
<td></td>
</tr>
<tr>
<td>Naik et al., 2008 (India)</td>
<td></td>
</tr>
<tr>
<td>Huan et al., 1999 (Vietnam)</td>
<td></td>
</tr>
<tr>
<td>Labarta, 2005 (Nicaragua)</td>
<td></td>
</tr>
<tr>
<td>Rejesus et al, 2010 (Vietnam)</td>
<td></td>
</tr>
<tr>
<td>Feder et al, 2004 (Indonesia)</td>
<td></td>
</tr>
<tr>
<td>Wu Lifeng, 2010 (China)</td>
<td></td>
</tr>
<tr>
<td>Ali &amp; Sharif, 2011 (Pakistan)</td>
<td></td>
</tr>
<tr>
<td>Pananurak, 2010 (China)</td>
<td></td>
</tr>
<tr>
<td>Van Rijn, 2010 (Peru)</td>
<td></td>
</tr>
<tr>
<td>Naik et al., 2008 (India)</td>
<td></td>
</tr>
<tr>
<td>Huan et al., 1999 (Vietnam)</td>
<td></td>
</tr>
<tr>
<td>Labarta, 2005 (Nicaragua)</td>
<td></td>
</tr>
<tr>
<td>Rejesus et al, 2010 (Vietnam)</td>
<td></td>
</tr>
<tr>
<td>Feder et al, 2004 (Indonesia)</td>
<td></td>
</tr>
<tr>
<td>Wu Lifeng, 2010 (China)</td>
<td></td>
</tr>
<tr>
<td>Ali &amp; Sharif, 2011 (Pakistan)</td>
<td></td>
</tr>
<tr>
<td>Pananurak, 2010 (China)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Weights are from random effects analysis.
Net revenues (income less costs)

<table>
<thead>
<tr>
<th>Study ID</th>
<th>ES (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FFS participants</strong></td>
<td></td>
</tr>
<tr>
<td>Labarta, 2005 (Nicaragua)</td>
<td>0.28 (0.02, 3.48)</td>
</tr>
<tr>
<td>Pananurak, 2010 (India)</td>
<td>1.06 (0.68, 1.66)</td>
</tr>
<tr>
<td>Waarts et al., 2012 (Kenya)</td>
<td>1.14 (0.92, 1.41)</td>
</tr>
<tr>
<td>Pananurak, 2010 (China)</td>
<td>1.17 (1.08, 1.27)</td>
</tr>
<tr>
<td>Pananurak, 2010 (Pakistan)</td>
<td>1.23 (1.09, 1.40)</td>
</tr>
<tr>
<td>Naik et al., 2008 (India)</td>
<td>1.25 (1.09, 1.42)</td>
</tr>
<tr>
<td>Van de Fliert 2000 (Indonesia)</td>
<td>1.31 (1.11, 1.55)</td>
</tr>
<tr>
<td>Van den Berg et al., 2002 (Sri Lanka)</td>
<td>1.41 (1.19, 1.67)</td>
</tr>
<tr>
<td>Yang et al., 2005 (China)</td>
<td>1.53 (1.10, 2.15)</td>
</tr>
<tr>
<td>Khan et al., 2007 (Pakistan)</td>
<td>3.40 (1.94, 5.97)</td>
</tr>
<tr>
<td>Subtotal (I-squared = 57.1%, p = 0.013)</td>
<td>1.28 (1.17, 1.41)</td>
</tr>
<tr>
<td><strong>FFS training + input/marketing support</strong></td>
<td></td>
</tr>
<tr>
<td>Birthal et al., 2000 (India)</td>
<td>1.43 (1.19, 1.72)</td>
</tr>
<tr>
<td>Van Rijn, 2010 (Peru)</td>
<td>2.00 (1.02, 3.94)</td>
</tr>
<tr>
<td>Cavatassi et al., 2011 (Ecuador)</td>
<td>3.34 (1.56, 7.15)</td>
</tr>
<tr>
<td>Palis, 1998 (Philippines)</td>
<td>4.61 (3.83, 5.56)</td>
</tr>
<tr>
<td>Subtotal (I-squared = 96.2%, p = 0.000)</td>
<td>2.57 (1.18, 5.58)</td>
</tr>
<tr>
<td><strong>FFS neighbours</strong></td>
<td></td>
</tr>
<tr>
<td>Pananurak, 2010 (India)</td>
<td>0.93 (0.66, 1.32)</td>
</tr>
<tr>
<td>Pananurak, 2010 (China)</td>
<td>1.07 (1.00, 1.14)</td>
</tr>
<tr>
<td>Pananurak, 2010 (Pakistan)</td>
<td>1.13 (1.01, 1.26)</td>
</tr>
<tr>
<td>Labarta, 2005 (Nicaragua)</td>
<td>1.39 (0.66, 2.92)</td>
</tr>
<tr>
<td>Khan et al., 2007 (Pakistan)</td>
<td>1.51 (0.51, 4.45)</td>
</tr>
<tr>
<td>Subtotal (I-squared = 0.0%, p = 0.706)</td>
<td>1.08 (1.03, 1.15)</td>
</tr>
</tbody>
</table>

NOTE: Weights are from random effects analysis.
Training of facilitators: Season long training of facilitators

Other inputs: Financial resources, inputs, physical set-up

FFS training provided to farmers: Season long training using participatory, discovery-based learning approach; including agro-ecosystem analysis and use of experimental plots, delivery of curriculum which has been partially determined by farmers

Knowledge acquisition: FFS participants acquire knowledge and skills, improved analytical decision-making

Adoption: FFS participants adopt new technology and management practices

Diffusion of knowledge (to non-participants, communication or observation)

Diffusion of practices (neighboring farmers adopt new technology and management practices)

Final outcomes: Yield, input-output ratio, income, health, environment, empowerment

Breakdown in causal chain
Why no diffusion?
Conclusions

• Evidence suggests FFS effective in improving farmer practices and agricultural outcomes among FFS-participants

• But practices and outcomes do not diffuse to neighbouring farmers

• Diffusion and sustainability may require regular training programmes, follow-up and backstopping

• SRs using program theory and broader range of evidence produce more useful conclusions
Thank you!
bsnilstveit@3ieimpact.org

www.3ieimpact.org