Working Paper

Agroforestry and Forestry in Sulawesi series:

Impact of agricultural-extension booklets on community livelihoods in South and Southeast Sulawesi

Amy Lumban Gaol and James Roshetko

World Agroforestry Centre

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Abstract

This working paper reports the findings of a survey conducted to identify the impact of extension publications (booklets, in particular) produced by the Agroforestry and Forestry in Sulawesi: Linking Knowledge to Action project (2011–2017). The survey was conducted in South and Southeast Sulawesi, Indonesia, two of three provinces in which the project operated. The sites included in the survey were Makassar City, and Bantaeng, Bulukumba, Jeneponto and Gowa districts, South Sulawesi; and Kolaka Timur, Konawe, Kota Kendari and Konawe Selatan districts, Southeast Sulawesi. The survey was conducted through semi-structured interviews with 191 respondents (35% female). Respondents had varying education levels, ethnicities, daily activities and incomes. These variables influenced their use of the project's advisory publications, leading to varied results and impact. Data collected during the survey covered sources of publications, types preferred and for what reasons, barriers to understanding and using them and the impact of the publications. It was found that respondents preferred extension booklets over other types of publications. The booklets motivated farmers to test new technology and share it with relatives and neighbours. Respondents report that adopting the technologies lead to improved management and yields.

Keywords

Rural advisory services, agricultural extension materials, farmer self-education, project publications.

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1. Introduction

An intermediate outcome (objective) of the Agroforestry and Forestry in Sulawesi: Linking Knowledge with Action (AgFor) project was *improved, sustainable and gender-equitable use of agroforestry and forestry products for livelihood systems by poor women and men based on improvement of their natural resource and agricultural awareness, access, knowledge and skills*. One way of raising communities' knowledge and skills is through verbal and written dissemination of technical and scientific information on agriculture, commodity crops and agroforestry systems (Perdana and Roshetko 2012).

Between 2012 and 2016, the project produced and disseminated various publications on agroforestry plant species and management, mainly focusing on the priority species identified by farmers, with the expectation that these publications would lead to improvements in the management of agroforestry systems and communities' livelihood systems.

A survey was conducted to identify the types of publications that farmers and others involved with the project had received and those they found most useful and to offer recommendations for future project publications. The survey also identified the impact that the project's publications, specifically booklets, had on respondents and how the information in the publications was applied on farms and in other places.

This paper is divided into several parts: an introduction that explains the background, the method, the results, respondents' recommendations, and conclusions. Specifically the paper focuses on extension booklets. The last part includes a review of communication problems in each province as well as making recommendations for activities related to publications. The information in this paper is based on survey results and field observations, with references cited when appropriate.

2. Survey method

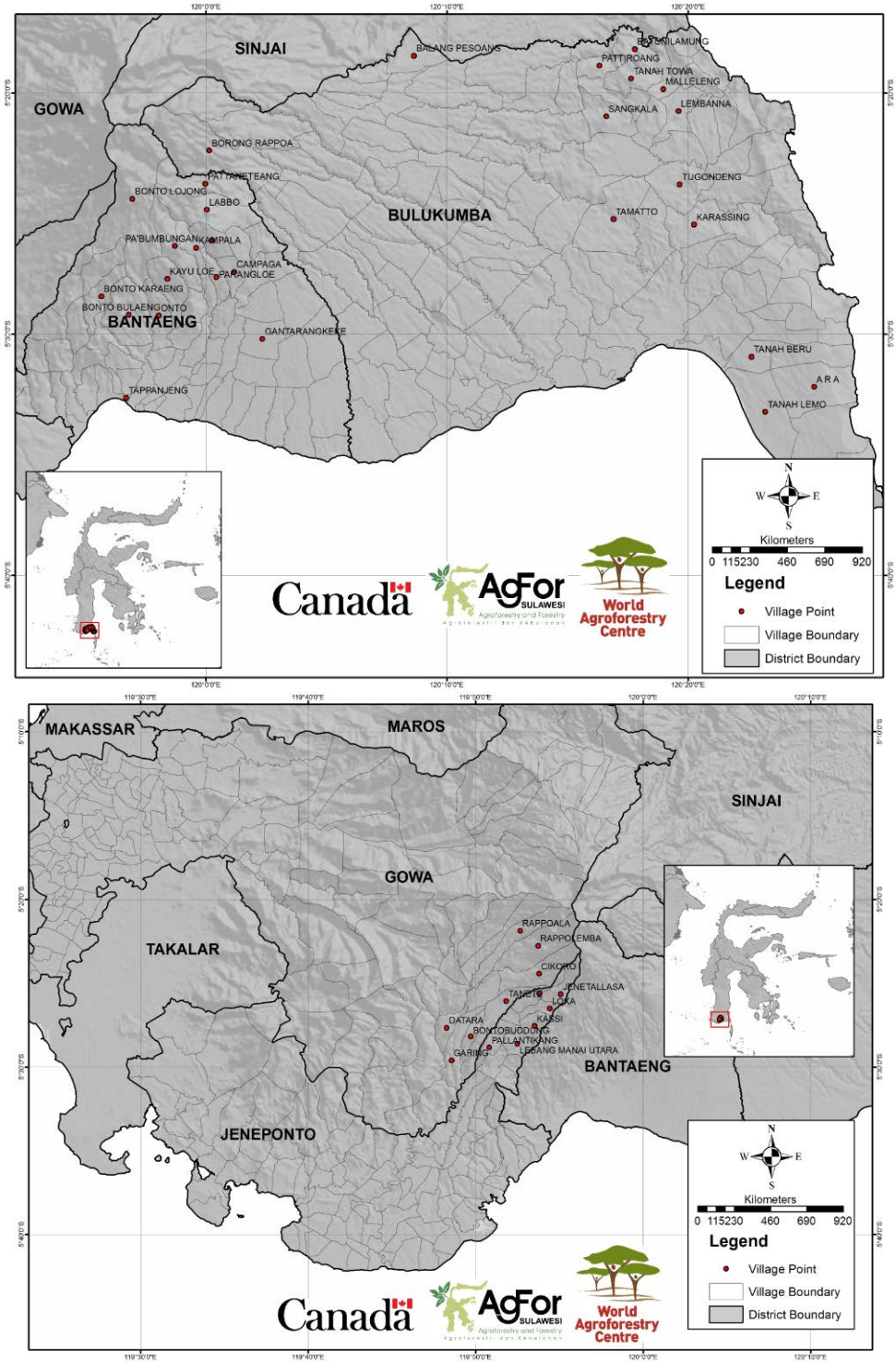
2.1 Study period and sites

The survey was conducted from October to November 2016 in Bantaeng, Bulukumba, Jeneponto and Gowa districts of South Sulawesi Province and Konawe, Konawe Selatan, Kolaka Timur and Kota Kendari districts in Southeast Sulawesi Province, where the AgFor project operated for five years. The survey was also conducted in Makassar City with urban-based project partners who were land owners or part-time farmers who were familiar with AgFor and its publications.

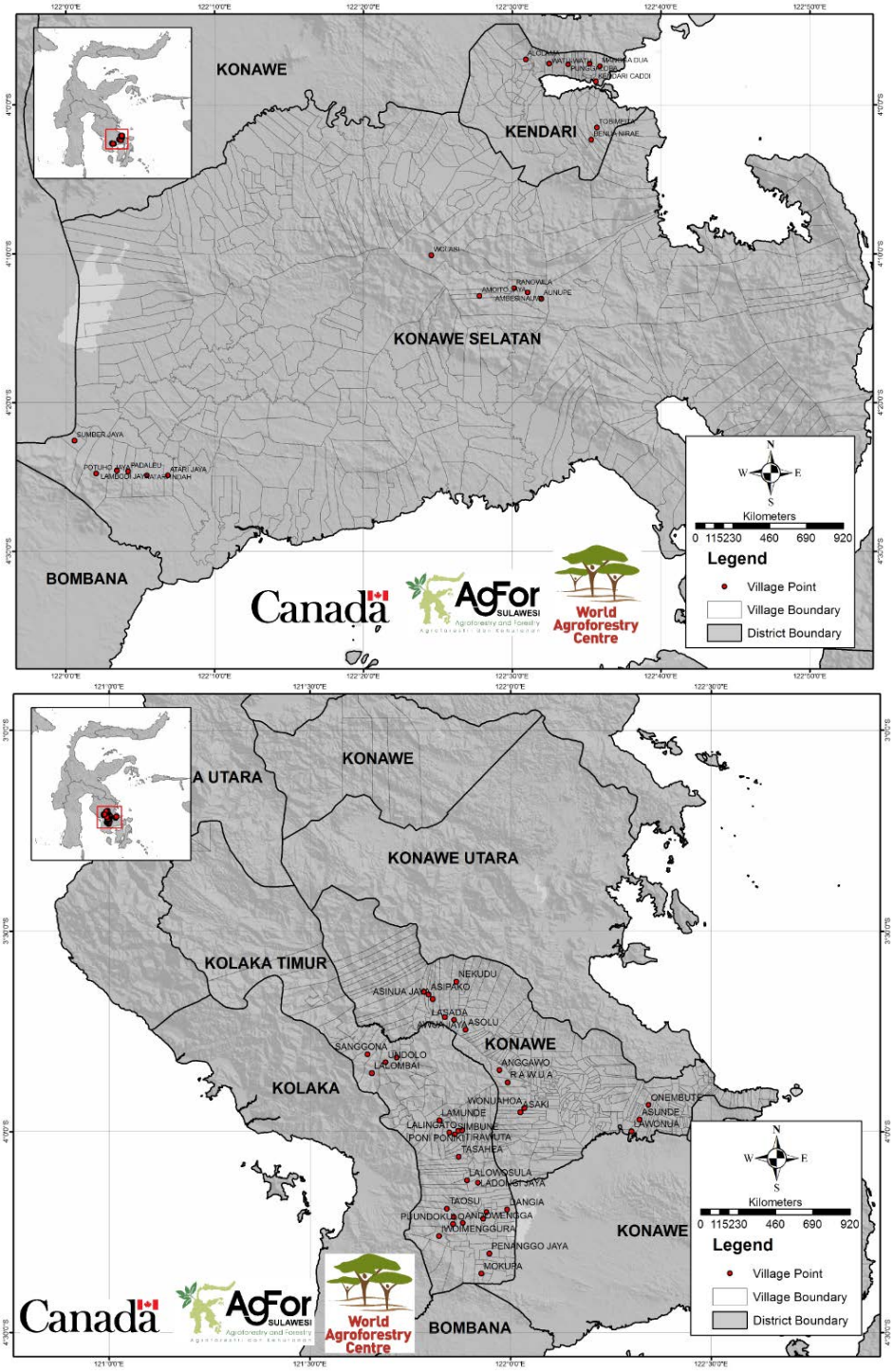
Ethnic composition varied in each district, from multi-ethnicity as was commonly found in Southeast Sulawesi and Makassar through to single or double ethnicity as was the case in four districts in South Sulawesi (Martini et al 2016).

Indonesian was mostly used to communicate between ethnicities and was the common language of most communities, with the exception of Bantaeng where Makassarese was the most common language spoken.

Geographic location of Survey location for AgFor projects



Infrastructure (electricity, telephone and road) and education levels also varied between districts. This factor influenced respondents' access to outside assistance, including AgFor publications.



2.2 Data collection and analysis

Data Collection

The publications impact survey was conducted through semi-structured interviews using stratified random sampling method with 191 respondents (122 males and 69 females) from various ethnicities, educational backgrounds and employment. Interviews were conducted during visits to respondents'

homes or offices. Appointments were made to ensure respondents' availability and convenience. Interviews with farmers were held in houses, gardens or rice fields. Respondents included farmers, government representatives, project partners and independent agricultural extensionists. Only people who had received or read AgFor booklets and factsheets were eligible to be respondents.

Data analysis

Data analysis was performed using descriptive statistical and correlation analysis because it provided simple summaries of the data and observations made during the survey. Descriptive statistics included in this paper are cross-tabulations and contingency tables, graphical representations, quantitative measures and descriptions of the situations.

Correlation analyses is a statistical technique to determine how strongly two or more variables are related. Spearman's rank correlation (r_s) is a non-parametric test used to measure the strength of association between two variables, where the value r = 1 means a perfect positive correlation and the value r = -1 means a perfect negative correlation (Daniel, 1990).

Spearman correlation is often used to evaluate relationships involving ordinal variables. The formula is:

$$r_s = 1 - \frac{6 \sum d_i^2}{n(n^2-1)}$$

Where : $\sum d_i^2 = \sum_{i=1}^{n} [R(X_i) - R(Y_i)]^2$, is difference between the two ranks of each observation

n = is the number of observations

However, a significance test must first be performed to decide based upon this sample, there is any or no evidence to suggest that linear correlation is present in the population. To do this we test the null hypothesis, H_0, that there is no monotonic correlation in the population against the alternative hypothesis, H_1, that there is monotonic correlation; the data will indicate which of these opposing hypotheses is most likely to be true. Let ρ_s be the Spearman's population correlation coefficient then we can thus express this test as:

$$H_0: \rho_s = 0$$

$$H_1: \rho_s \neq 0$$

3. Survey results and discussions

3.1 Profile of respondents

Respondents of the survey were smallholding farmers, farmer extensionists, government representatives, project partners and other interested parties.

The total number of respondents was 191 (98 in South Sulawesi and 93 in Southeast Sulawesi), of whom 67 were female (39 in South Sulawesi and 28 in Southeast Sulawesi).

Respondents were selected based on their familiarity with the AgFor project and its publications. No matter what their profession or daily activity, all respondents had agricultural experience. Those working in urban areas were originally from rural areas, worked part-time as farmers or owned farmland in their home village that was generally cultivated by family members.

In general, 35% of all respondents were female (67) and 65% male (124).

Below are a summary table and figure of respondents based on gender in South and Southeast Sulawesi.

Table 1. Respondents' gender by province

Respondents' gender	South Sulawesi	Southeast Sulawesi	Total
Female	39	28	67
Male	59	65	124
Total	98	93	191

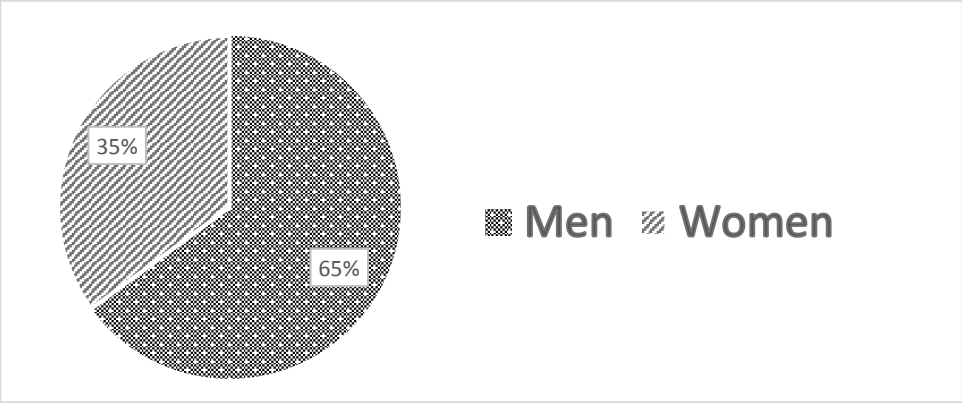


Figure 1. Respondents' gender (percentage of total respondents)

Respondents included 73 farmers (52 male and 21 female farmers), 10 housewives, 34 government employees (24 men and 10 women), 31 farmer extensionists (24 men and 7 women) and 43 people with other occupations (34 men and 19 women). Included in other occupations are public health worker, driver, labourer, security guards, trader/seller in local market, office cleaner/janitors, NGO workers and project partners.

The top five ethnicities of the respondents were Makassarese (33%), Bugis (23%), Tolaki (12%), Javanese (10%) and Munanese (6%). Educational backgrounds ranged from no education (3%) through graduates of elementary school (14%), junior high school (10%) and senior high school (30%) to university (43%). Of those who had graduated from university, 5% were farmers.

Publications distributed to respondents were factsheets, booklets, DVDs, bulletins and policy briefs. The survey results indicated that booklets were most received by community members. Of 191

recipients, 160 received booklets, 27 received factsheets, 23 received DVDs, 7 received project bulletins/newsletters and 1 received a policy brief.

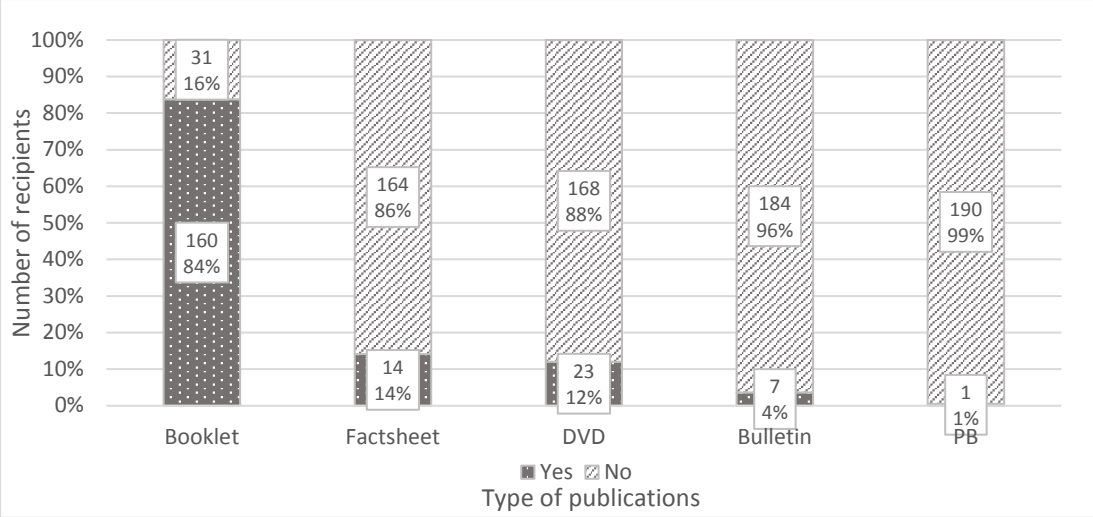


Figure 2. Number and percentage of publications received

We can see from the figure above (Figure 2) that booklets were the project publication most commonly acknowledged by respondents (84% of respondents), thus, this paper focuses on the impact of the booklets on community livelihoods.

It should be noted that AgFor process documentation indicate that all farmer, extensionist, and government partners received factsheets and bulletins. Subsequent discussions with farmers and other partners indicate that factsheets and bulletins received were considered temporary source of information, as they consisted of a few pages and did not have a cover. Factsheets are often lost or thrown away. Also, generally the ratio of illustration to text was lower and the text written in a more complex manner.

Pepper nursery in Southeast Sulawesi.
Photo: World Agroforestry Center/ Yusuf Ahmad

3.2 Sources of booklets

Most of the respondents received the booklets from AgFor staff who assigned to the area at the time. In the figure below, it can be seen that 81% of respondents reported they received booklets from AgFor staff, either during visits to their house or village or during events or workshops.

Some respondents who did not receive booklets reported borrowing then from their neighbours, relatives and extensionists.

Besides direct receipt from AgFor staff, recipients received booklets several other ways: at events or village activities; from the head of their village, their neighbours, the head of their farmers' group, and from government officers and independent extensionists.

Of 191 recipients, 155 (81%) received booklets from AgFor staff. And 92% of all respondents have participated in one or more AgFor project activities, such as training, workshops or group discussions. They also mentioned that this was the most preferred and effective way because the staff also clearly explained the content.

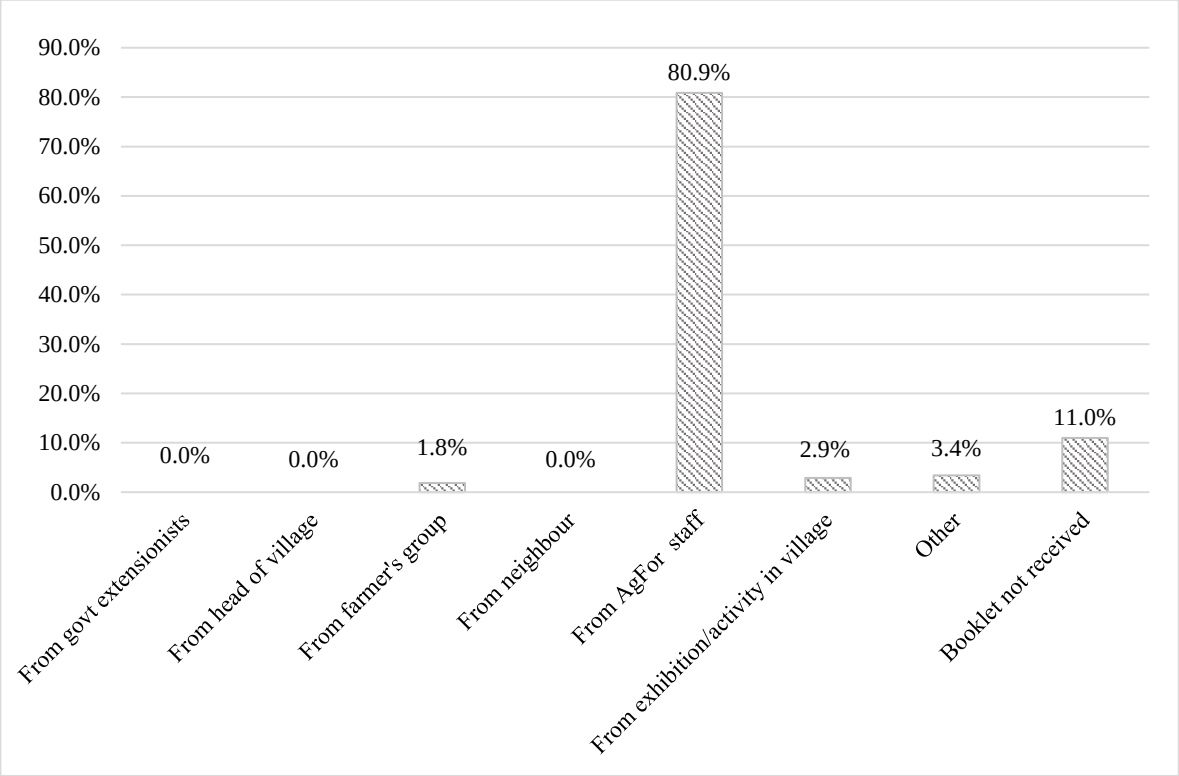


Figure 3. Percentage of sources of booklets

3.3 Preference for booklets

The AgFor project published and distributed eight different booklets on clove, durian and rambutan, orange, coffee, cacao, pepper, nutmeg and organic fertilizer.

The figure below shows that most respondents, 42.4% from 191 had read all eight in the series. However, the number of those who had never read one is the second highest (30 people). It is

important to note that these respondents (15.7% of all respondents) stated that they could not read and had asked family members to read to them. These respondents stated that the DVD on organic fertilizer preparation and use was very beneficial, enabling them to learn by themselves.

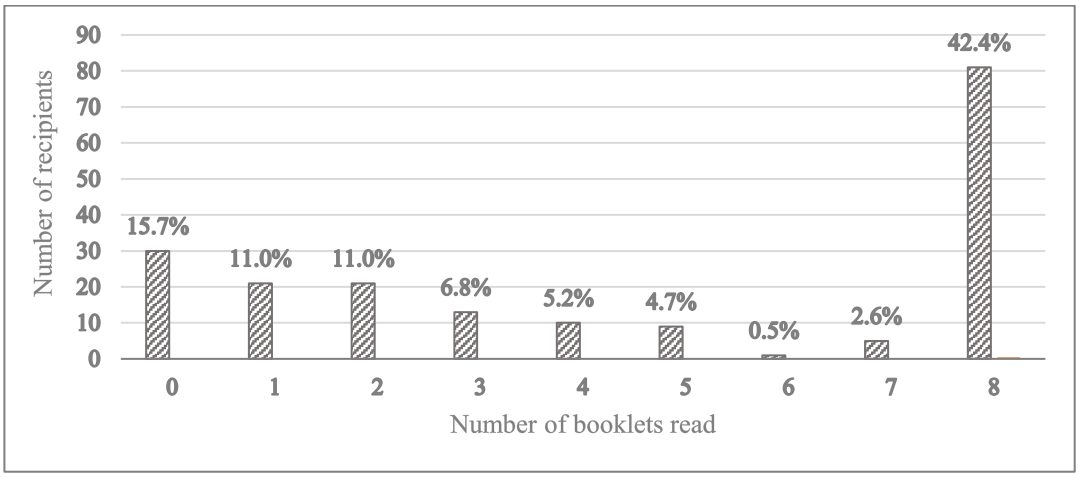


Figure 4. Number of booklets read

3.4 Impact of booklets in South and Southeast Sulawesi

For impact of the booklets, we used Spearman rank correlation to analyze the strength of monotonic correlation between the number of booklets received, number of booklets read and score of farm management changes variables. Score of farm management changes variables is measured by accumulating changes of farmer's practices such as: 1) Land management; 2) Seedling production; 3) Grafting; 4) Planting; 5) Fertilizing; 6) Pruning; 7) Pest and disease control; 8) Harvesting result. For example, if the respondent changed the management in pruning and fertilizing the score would be 2.

Table 2. Spearman's rank correlation score of booklets received and read with changes in farm management

	Number of booklets received	Number of booklets read	Score of farm management changes
Number of booklets received	1		
Number of booklets read	0.748**	1	
Score of farm management changes	0.254**	0.285**	1

** Correlation is significant at the 0.01 level (2-tailed).

According to the Spearman's rank correlation data analysis, the number of booklets received and number of booklets read had a significant influence on changes to farm management (at a significance level of 0.01). The correlation scores between number of booklets received and score of farm management and also the number of booklets read and score of farm management—which were 0.254 and 0.285 respectively —indicate a weak positive monotonic correlation. This means that an increase

in the number of booklets received or the number of booklets read can increase the score of farm management changes.

Respondents put into practice the technical information, specifically, on how to graft, prune and fertilize their tree gardens and improve their harvesting methods. These practices all contributed to improving household incomes and enhancing livelihoods and living conditions.

Some important survey findings regarding the impact of the booklets follow.

1) Farmers were motivated to implement the technical information (specifically, planting distances, regular pruning, grafting and fertilizing) that they learned from reading the booklets.

2) Sixty-two (62%) of respondents stated that the clear instructions with pictures motivated them to put the recommendations into practice. The pictures were reported as being particularly helpful in guiding respondents to implement good farm management, such as performing regular maintenance to prevent pests and diseases.

3) Farmers were eager to share with their relatives and neighbours the new knowledge and skills that they learned from the booklets. Implementing the new technical information from the booklets resulted in improved production and larger yields. Extension agents shared the technical information with other farmers and people around them, including relatives from other communities during familial visits. These agents worked for the government extension agency (BP4K) and used AgFor booklets as tools to share knowledge in their assigned villages. However, they did not distribute the booklets, which were their personal copies or belonged to the BP4K library.

4) Better farm management resulted in better harvests in both quantity and quality, with less waste. Thus, higher incomes, better returns on input (time, labour etc.) and improved livelihoods.

Examples of booklets that gives impact on farm management

The booklets' impact on farm management is detailed in the figure below.

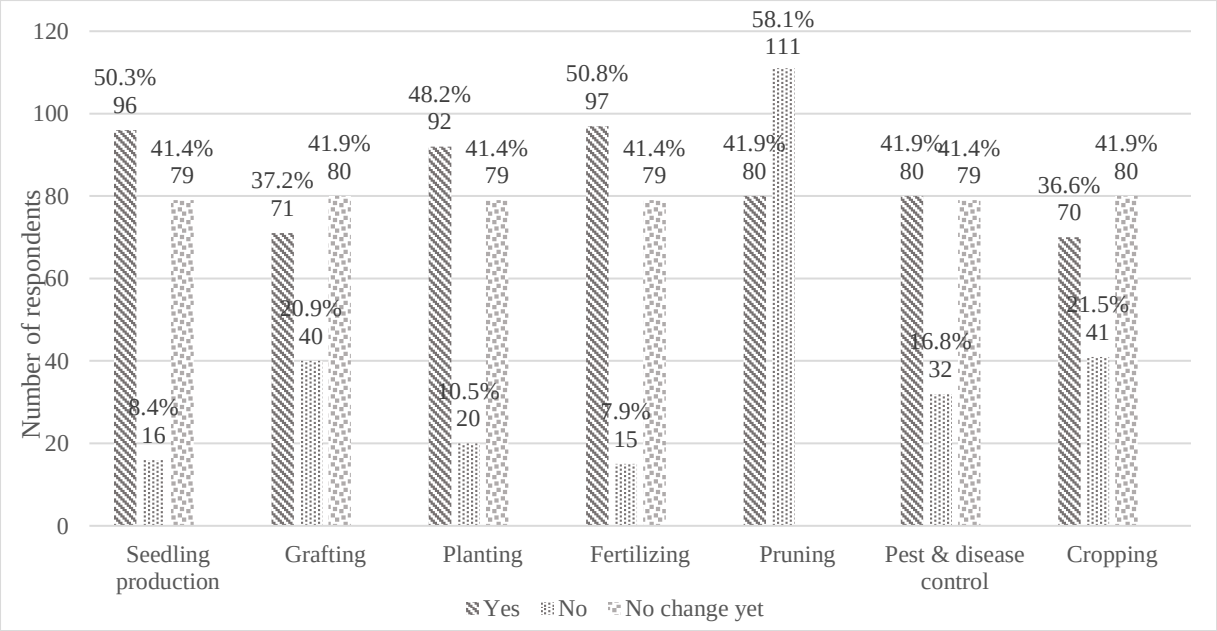


Figure 5. Changes in farm management

Seedling production. Ninety-six respondents (50.3%) stated that they had increased their seedling production; 16 (8.4%) respondents reported no change; and 79 (41.4%) respondents reported no change at the time of the survey but they had recently adopted improved seedling production practices.

Grafting (vegetative propagation). Seventy-one respondents (37.2%) stated that they had increased the quality of the seedlings they produced; 40 (20.9%) respondents reported no change; and 80 (41.9%) reported no change at the time of the survey but they had recently adopted improved grafting practices.

Tree planting. Ninety-two respondents (48.2%) stated that they had increased the number of seedlings planted on their farm; 20 respondents (10.5%) reported no change; and 79 respondents (41.4%) reported no change at the time of the survey but they planned to plant more trees soon.

Fertilizer application. Ninety-seven respondents (50.8%) reported that they had benefited from improved fertilizer application methods; 15 respondents (7.9%) reported no change; and 79 respondents (41.4%) reported no change but they had recently adopted improved fertilizer application methods and expected to benefit later.

Pruning. Eighty respondents (41.9%) stated that their crop yields had increased owing to the use of improved pruning methods; and 111 (58.1%) respondents reported there had been no change.

Pest and disease control. Eighty respondents (41.9%) stated that their capacity to control pests and diseases had improved; 32 respondents (16.8%) reported no change; and 79 respondents (41.4%)

reported no change at the time of the survey but they had only just recently adopted improved pest and disease management practices.

Intercropping. Seventy respondents (36.6%) stated that they had improved their intercropping patterns; 41 respondents (21.5%) stated no change; and 80 (41.9%) respondents stated they had only recently adopted new intercropping patterns.

The figure above shows that a majority of respondents had adopted new management practices from the booklets. A clear exception is pruning. Additionally, many respondents stated no change yet clarified that they had only recently adopted the management practice on their farm.

3.5 Barriers to acquiring booklets

In some remote areas where infrastructure and road conditions were very poor, the dissemination of AgFor publications had been hindered. AgFor staff and extension agents (both government and independent) had difficulty reaching such areas. However, villagers in these places benefited by borrowing booklets from their relatives or government and independent extensionists.

Most of the respondents (74%) were satisfied with the booklets. A few (3%) requested more pictures and thus more pages in the booklets. Sixteen percent (16%) of respondents asked for booklets on additional topics, such as post-harvesting information, how to store some specific commodities, infographics of price and market fluctuations, production technology for annual crops, and pest and disease control.

Other barriers limiting full use of the booklets were language and reading ability. As presented in the figure below, 9% of respondents had difficulty understanding the booklets because of limited Indonesian language ability. They requested the booklets be published in their language (Makassarese or Bugis).

Twelve percent of the respondent stated that the illustrations needed to be improved. However, 84% said that the pictures were very helpful when they implemented the technical information on their farms. These numbers included all the elderly respondents, who have difficulty reading and depend on family members to read to them. For these people, solutions were watching DVDs or only looking at the pictures in the booklets.

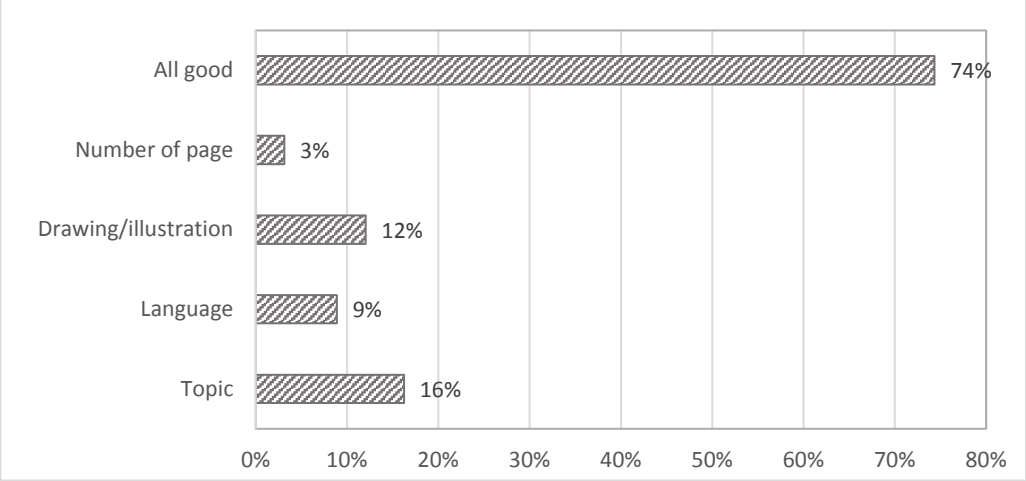


Figure 6. Percentage of respondents' comments on what needed improvement

4. Respondents' recommendations

Recommendations from the 191 respondents varied greatly, encompassing content, distribution channels, languages, topics, and sizes of booklets and factsheets. Respondents were able to provide more than one recommendation. In table below, total responses from 191 respondents are 275.

Many respondents (43.5%) stated that they were happy with the booklets and other publications. Most of the other respondents, while generally happy with the publications, had some suggestions for improvement. Their suggestions are compiled in the table and figure below. Two respondents (1%) did not like the publications nor provide any input or suggestions.

Twenty six respondents (13%) suggested an increase in the number of publications in order to reach more readers and so it would not be necessary to borrow from extensionists or heads of farmers' groups.

AgFor training on Nursery
Photo: World Agroforestry Centre/Hendra Gunawan

Table 3. Respondents' comments

Comment	Score of respondent's comment	Percentage of respondents
All publications are good and handy	83	43.5%
More pictures and detailed information on post-harvest, marketing and new technology in agriculture	70	36.6%
Print more copies to reach more recipients	26	13.6%
Less terms in English or Latin; and it would be better to have the translation in local language	21	11.0%
Make a publication with specific topic, such as potato, coconut, cassava, mushroom, grand forest park and conservation of land and water	15	7.9%
All publications should use hardcover to make it long lasting and add additional empty page for note	14	7.3%
Font should be bigger	14	7.3%
All publications should have audio form (or in video) so those who cannot read can still get the knowledge	11	5.8%
Each publication should be completed with supporting tools for extensionists	8	4.2%
Size of factsheet should be smaller	6	3.1%
There should be a contact person on all publications	5	2.6%
No input	2	1.0%
Total responses	275	--

5. Conclusion

The study provided an analysis of the impact of advisory booklets on community members, specifically, regarding the adoption of technical information to improve farm management. In general, the technical information in the booklets was very useful and improved readers' knowledge. Farmers who put into practice the technical knowledge stated that their yields had improved in quantity and quality and, thus, their household incomes had increased.

Some key findings follow.

1. Farmers were more motivated to work on their farm or in their garden to implement the technical information (specifically planting distances, regular pruning, grafting and fertilizing) after reading the booklets.
2. Farmers were eager to share with their relatives and neighbours the new knowledge and skills they learned from the booklets.
3. Farmers had improved the management of their farms by adopting the practices described in the booklets.
4. Better farm management resulted in better harvests, in quantity and quality, with less waste. Thus, higher incomes, better returns on input (time, labour etc) and improved livelihoods.

In some remote areas where the infrastructure and road conditions were very poor, the dissemination of publications was hindered. Villagers from these areas mostly accessed booklets by borrowing them from their relatives (or government/independent extensionists.

Other barriers to fully using the booklets were the language and the farmer's reading ability although only few respondents preferred to have the booklets in their local language (Makassarese or Bugis). Others, including the elderly who had difficulty reading, requested all topics be produced on DVD and/or the booklets contain more pictures.

Women in Southeast Sulawesi sorting their cacaos after harvest.
Photo: World Agroforestry Centre/Yusuf Ahmad

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