

**THE NON-OPERATOR LANDOWNER AND AGROFORESTRY:
AN ANALYSIS OF FACTORS ASSOCIATED WITH INTEREST IN
AGROFORESTRY PRACTICES**

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ABSTRACT

Land tenure has long been considered a critical factor in determining the adoption and long-term maintenance of agroforestry practices. Empirical evidence from tropical countries has consistently shown that secure land tenure is positively associated with agroforestry adoption. In the US, more than 40 percent of the private land employed in agriculture is farmed by someone other than the owner. Given the clear importance of land tenure in agroforestry decisions overseas and the magnitude of non-operator landownership in the US, there has been surprisingly little focus on land tenure in the temperate agroforestry literature. Using data from a 1999 survey in Missouri, this study seeks to provide insight into factors associated with non-operator landowner interest in agroforestry.

Results suggest that differences in farming orientation affect interest in agroforestry. Closer ties to farming, stronger financial motivations for landownership, and higher proportion of land planted to row crops were negatively related to interest in agroforestry among non-operator landowners. On the other hand, environmental or recreational motivations for landownership and contacts with natural resource professionals were positively associated with interest in agroforestry. These results, consistent with earlier qualitative research suggesting that farm operators who have a strong “conventional farming identity” were less interested in agroforestry, point to a divide between landowners for whom environmental and recreational values play an important role in ownership motivation and those for whom financial considerations take precedence. The findings imply that agroforestry development programs in the US should take non-operator landowners and their farming and ownership orientations into account when designing research and outreach efforts.

Keywords: adoption; non-operator landowner; land tenure

INTRODUCTION

Land tenure has long been considered a critical factor in determining the adoption and long-term maintenance of agroforestry practices (Mercer 2004; Pattanayak et al. 2003). In his review of agroforestry adoption studies from the tropics, Mercer (2004) found that in all studies in which tenure was a significant variable, secure land tenure was positively associated with adoption. Pattanayak et al.'s (2003) meta-analytical review of agroforestry adoption studies showed that landowners are more likely than tenants to adopt agroforestry practices. The interpretation of the consistently positive relationship between agroforestry adoption and land tenure is unambiguous: the long-term production horizon of agroforestry practices makes secure land tenure a virtual precondition to agroforestry adoption.

What role might land tenure play in the agroforestry adoption decisions of US landowners and farm operators? A high proportion of agricultural land in the US is farmed by someone other than the owner. According to 1999 Agriculture Economics and Land Ownership Survey (AELOS) estimates, approximately 2.3 million landlords rented 419 million acres of agricultural land to farm operators. Of those, 1.4 million private non-operator landowners accounted for about 390 million acres. That acreage represents 42 percent of the private agricultural land and 94 percent of the rented land employed in agriculture in the US (Economic Research Service 2000, 267).

Given the clear importance of land tenure in adoption decisions overseas and the magnitude of non-operator landownership in the US, there has been surprisingly little focus on land tenure in the temperate agroforestry literature. One reason may be the general lack of agroforestry adoption studies undertaken in the temperate zone.¹ However, that would not explain the absence of land tenure as an issue in major US agroforestry publications such as AFTA (2002) and Workman and Allen (2004).

While it is likely that land tenure status would be a factor in agroforestry adoption decisions in the US as it is in other countries, the lack of empirical agroforestry adoption research in the US limits our ability to draw conclusions. Nevertheless, we can look to the literature on conservation practice adoption for guidance. Studies on the adoption of soil and water conservation practices have focused on land tenure as a determinant of landowner likelihood to adopt. Clearfield and Osgood's (1986) review of adoption studies notes that the relationship between ownership and conservation practice implementation has generally been found to be positive. More recently, Featherstone and Goodwin (1993) found that investment in conservation practices was inversely related to the proportion of rented land on farms. Soule et al. (2000) disaggregated short- and medium-term practices to test tenure effects on adoption of conservation practices with longer benefit horizons such as grassed waterways or terraces. They found that renters were less likely to adopt medium-term practices than were owner-operators, confirming their hypothesis that adoption of medium- or long-term conservation practices would be associated with land ownership. Fraser's (2004) study of land tenure and soil conservation practices in British Columbia showed results of particular interest to the agroforestry field: while

¹ The two US studies included in Pattanayak et al. (2003) meta-analysis of agroforestry adoption studies focused on "related technology adoption" rather than agroforestry adoption, presumably due to a lack of the latter type of study done in the US.

renters tended to plant crops with short-term returns, farm ownership was associated with investment in long-term crops such as perennial fruiting bushes and vines.

Kurtz (2000, 349) relates this renter/owner adoption problem to agroforestry: “If an operator is not certain that a payoff from an investment is forthcoming during the period in which a land resource is used, it is not likely that the investment will be made.” Decisions concerning adoption of practices that have long production horizons or require alteration of the landscape—to which category agroforestry belongs—would be primarily the landowners’ to make. Given that more than 40 percent of agricultural land in the US is rented from non-operator landowners, agroforestry adoption research should focus on the relationship between this group and agroforestry. This exploratory study seeks to shed light on this understudied area by providing insight into the factors that shape non-operator landowner interest in agroforestry practices.

METHODS

Study Context

The data for this study were gathered in 1999 as part of a larger EPA-funded research project entitled “The Economic and Social Value of Flood Plain Agroforestry to Rural Development Projects.” Data were gathered from two sites: the Fox Wyaconda watershed (FWW), located in northeast Missouri, and Scott County (SC), located in southeast Missouri. The landscape of the FWW, which comprises 430,000 acres, is a mix of cropland, pasture, and hayland, and forest across both hills and floodplains along the Mississippi, Wyaconda, and Fox rivers. SC, smaller than the FWW at 273,000 acres, is primarily (82 percent) Mississippi River delta, but also contains some upland. The rich soils of the delta portion are intensively cultivated, while the upland area is similar to the FWW in terms of landscape (Valdivia et al. 2003, 5).

Variable Selection and Measurement

This study is an attempt to understand non-operator landowner interest in agroforestry. As such, it should not be considered an adoption study. It does, however, look to adoption studies from the soil and water conservation literature to guide the selection of variables employed in the analysis. The primary objective of this study is to assess the relationship between non-operator landowner interest in agroforestry in the study areas and factors shown to be related to farm operator and landowner propensity to adopt conservation practices. Based on a review of soil and water conservation practice adoption literature, we hypothesize that four general areas will influence non-operator landowner interest in agroforestry implementation: (1) farming community; (2) ownership motivation/orientation; (3) knowledge of agroforestry; and (4) demographic characteristics.

Independent Variables

The Farming Community

Raedeke et al. (2003), in an earlier article based primarily on qualitative data from this same overall study, found that farm operators who had a strong conventional farmer identity were skeptical of agroforestry. They note that family and rental relations exerted pressures to conform

to a “good farming” ideal and militated against the prospect of planting trees in cropland. Salamon et al. (1997) comparison of “sustainable” and “conventional” farming families led to similar findings. Their study indicated that community expectations and values can be opposed to farming practices that depart from established norms. Using length of land ownership (individual or family) and farm experience as a proxy for connection to the farming community, Raedeke et al. (1998) found that these factors were negatively associated with interest in conservation program participation.

The first set of farming community variables that we employ relates to the land. Two variables are measures of participation in farming: whether the respondent or their spouse ever farmed their land and whether anyone in the family was currently farming the land. These two variables were combined into one binary variable representing family participation in farming their land. Two variables measure family landownership continuity: how long the land had been in the family and likelihood that the land would be passed down to someone in the family. A second set of variables are measures of the influence that other actors in the farming community—other farmers/landowners, potential renters, and bank/lending institution representatives—have on farm/land management decisions. Because previous studies have found that farming community pressures can be negatively associated with alternative practices, we expect to find a negative relationship between each of these variables and interest in agroforestry.

Two variables relate to what have traditionally been termed “change agents” or information sources: Extension and natural resource professionals (NRPs). The role of communication sources and communication channels in transmitting information on innovations has been a core focus of adoption research since its inception (Fliegel 1993; Rogers 2003). In terms of influence on conservation practice adoption, however, results have been mixed. Lockeretz (1990) points out that using number of contacts with conservation professionals as an explanatory variable can be problematic. Particularly if contact is voluntary, as it often is, does this variable measure the influence of conservation professionals on landowner decision making or landowners' willingness to address problems that they have identified on their land? This ambiguity notwithstanding, contact with Extension or conservation professionals is generally hypothesized to be positively associated with adoption of innovations, whether production or conservation oriented.

To assess the relationship between non-operator landowner interest in agroforestry and contact with information sources, we include two variables in the analysis: number of field days or demonstrations about farming or land management attended and number of times the landowner had received advice from a professional such as a “Soil and Water Conservation District (SWCD) technician or an agricultural business person” over the previous two years. Both of these variables are potentially problematic due to ambiguity about contact purpose. The first variable does not tell us what the focus of attended field days was: they could have dealt with anything from pesticide management to conservation buffers. The second variable is equally ambiguous. While it is reasonable to assume that contacts with SWCD technicians would be conservation-related, it is equally reasonable to assume that contacts with “agricultural business persons” would be strictly production oriented. These variables are included in the analysis nevertheless, though hypotheses about direction of influence are not made.

Farming orientation and ownership motivations

Nowak and Korsching (1998) note that a number of studies have theorized that conservation behavior may be related to orientations toward farming or motivation behind landownership. Some farmers may be more commercially oriented while others may lean more toward an environmental, or stewardship orientation, and their orientation can affect their interest in adoption of conservation practices. Salamon et al. (1997) found that families that had adopted “sustainable” practices often had strong environmentalist traditions or stewardship perspectives that influenced their adoption decisions. Allen and Bernhardt (1995) found that farmers who were less likely use synthetic fertilizers and herbicides and more likely to employ conservation practices such as field windbreaks and rotational grazing had “worldviews” that corresponded to an alternative agricultural paradigm. Koontz (2001), in his study of landowner motivations in Indiana, found that landowners who did not rely on their land for a substantial portion of their income were much more likely to cite nonmonetary benefits of landownership than owners who did. Commonly cited motivations were aesthetic values and protection of soil and wildlife habitat. These studies suggest that landowners’ attitudes or motivations can have an influence on the type of production practices that they pursue.

We focused on two dimensions of landownership motivation: environmental/recreational and financial. Two index variables measure the role of these distinct motivation types play in landowner decisions to own land. The environmental/recreational motivation index was constructed by adding the respondents’ ratings of the influence that three environment or recreation-related motivations have on their owning land: likes being on the land and enjoys its natural beauty; enjoys recreation on land; and enjoys seeing wildlife.² The financial motivation index was created by adding the respondents’ ratings of the influence that three financial-related reasons have on their owning land: owning farmland provides a good financial shelter; the land is a good investment; and the land provides a good source of income.³ It is expected that environmental and recreational motivations for landownership will translate into interest in agroforestry, while financial motivations will be negatively associated with interest in agroforestry.

A third variable that relates to farming orientation is percentage of land planted to row crops. Row crop farming is a hallmark of the conventional farmer. It is intensive use of land that requires greater mechanization, labor, and purchased inputs such as fertilizers and pesticides than do grazing or forestry. Soule et al. (2000) found that percentage of land in corn and soybeans was negatively associated with landowner adoption of medium-term conservation practices. We expect a similar relationship to interest in agroforestry. We hypothesize that greater involvement in row cropping, even indirectly through income from leasing arrangements, will translate into a stronger farming identity and be negatively associated with interest in agroforestry.

Knowledge of agroforestry

Awareness of a practice is, of course, a precondition to adoption. Beyond awareness, degree of knowledge regarding the application of farming practices, conservation or otherwise, is a necessary (though not sufficient) condition for adoption. Knowledge becomes particularly critical in association with complex and unfamiliar practices due to uncertainty (Pannell 1999).

² Alpha = .715

³ Alpha = .840

To measure respondent knowledge of agroforestry, we include an overall knowledge index in our analysis. The index was constructed by summing respondents' rating of their level of knowledge of the five agroforestry practices under consideration: silvopasture, riparian/streambank plantings, alleycropping, windbreaks, and forest farming.⁴ Although it is possible that increased knowledge of innovations can lead to nonadoption or disadoption of practices, we hypothesize that degree of knowledge will be positively associated with interest in agroforestry.

Demographic characteristics

Demographic variables such as age, education, and gender have long been examined as potential determinants of landowner propensity to adopt conservation practices (Clearfield and Osgood 1986; Nowak and Korsching 1998; Traore, Landry, and Amara 1998), though empirical results on these variables have been mixed (Lockeretz 1990). Feder and Umali (1993) cite several studies indicating that age is negatively associated with adoption due to the shorter planning horizons of older farmers. Feder and Umali (1993) also point out that education level has been found in numerous studies to have a positive relationship to conservation practice adoption. We expect to find similar relationships between age, education level, and interest in agroforestry.

Dependent Variable: Interest in Agroforestry

The dependent variable, average overall interest in agroforestry practices, was constructed from a set of five questions that respondents answered after examining two images of each practice and reading a corresponding definition.⁵ The definitions given for each practice were: (1) silvopastoral—intentionally planting or managing trees in pastures; (2) riparian buffers/streams side plantings—planting trees, shrubs, and grasses along streams and waterways; (3) alley cropping—crops grown in wide alleys between rows of trees; (4) windbreaks—trees planted as barriers against the wind; and (5) forest farming—growing crops under the shade of trees. Using a scale from 1 (uninterested) to 4 (very interested), respondents were asked to rate how interested they might be in implementing each of the five agroforestry practices on their land. An index variable was created by summing the five scales and dividing that number by five.

Data Collection

The sampling frame for this study consisted of all non-operator landowners in the FWW and in SC. In the FWW, a list of all area farmland owners was provided by the NRCS. Two hundred ninety-two non-operator landowners were identified from the larger list. Of these, one-third were found to live farther than 30 miles from the watershed. The survey instrument was mailed to the entire sampling frame of 292 landowners. One hundred eleven surveys were completed and returned, for a response rate of 38 percent (Valdivia et al. 2003, 5).

In SC, the local Farm Services Agency office provided a list of 696 nonfarming landowners. This sample frame was stratified by distance of residence from SC (less than/more than 30 miles)

⁴ Alpha = .814

⁵ For silvopasture agroforestry, a third image was included of cattle grazing in a forested area with the note: "cows grazing in a forested area without any intentional management of the trees is not considered silvopastoral." For forest farming, photos of ginseng and mushroom cultivation were accompanied by the note: "Examples of forest farming: growing ginseng and shiitake mushrooms."

in order to match the proportion of absentee to local landowners found in the FWW. A stratified random sample of 150 landowners from within 30 miles of the county line and 77 landowners who lived further away was drawn. The surveys were mailed to these 227 landowners. One hundred twenty-eight surveys were completed and returned for a response rate of 56 percent. The overall response rate was 46 percent, resulting in a final sample of 239 non-operator landowners.

Analysis

The data were analyzed using Ordinary Least Squares (OLS) regression. The model regressed overall interest in agroforestry practices on the 14 independent variables. A number of the variables included in the model had missing values. When missing values are present throughout observations and variables in a multivariate study, listwise deletion in regression analysis can result in a significant loss of data (Newton and Rudestam 1999). There are a number of strategies that may be employed to deal with missing values. When fewer than 15 percent of observations are missing for a given variable, imputation, or estimation of the missing values, may be used (Newton and Rudestam 1999). For this study, we employed mean substitution to estimate missing values for a number of variables. Although this method reduces the variance associated with the variables for which it employed, and therefore results in a reduction of statistical power, it is a conservative method that does not bias results unduly (Newton and Rudestam 1999).

RESULTS

Descriptive Results

Demographic, farm, and farming characteristics

Landowners in the sample averaged 61 years of age (table 1). Nearly 40 percent reported that they were college graduates. They owned, on average, 361 acres of land, at least a portion of which had been in the family for an average of 58 years. The average likelihood that the land would be passed on to someone in the family was 3.9 on a five-point scale. Taken together, these data indicate a high level of intergenerational landowning continuity among the sample landowners.

Given the average length of ownership and apparent intergenerational continuity, the percentage of landowners (or their spouses) who had actually farmed the land in question was surprisingly low, at 41 percent. Twenty-seven percent of respondents indicated that a family member was currently farming the land. Fifty percent of respondents had either farmed the land or had a family member farming it at the time of the survey. The majority of respondents' land (57 percent) was reported to be cropland, while 12 percent was pasture or hay land and 4 and 14 percent was in managed or unmanaged timber, respectively.

In terms of contacts with agricultural or conservation information sources, only 16 percent of respondents had attended a field day or other similar event in the past two years (table 2). Thirty-two percent had received advice from a professional such as a SWCD technician or agricultural businessperson over the same time period. On average, respondents reported that

other actors in the field of agriculture had a moderate influence on their decisions. Opinions of potential renters had the most influence, at 2.8 (out of five), with opinions of other farmers (2.4) and bankers or other lenders (1.5) following in importance.

Table 1. Demographic, farming, and farm characteristics variables (n=239).

Age (mean)	61
College graduate (percent)	39
Respondent or spouse once farmed their land (percent)	41
Family member currently farming land (percent)	27
Respondent or spouse farmed or family member farming (percent)	50
Proportion of land in crops (percent)	57
Proportion of land in pasture/hayfields (percent)	12
Proportion of land in managed timber (percent)	4
Proportion of land in unmanaged timber (percent)	14

Table 2. Contacts and Influence (n=239).

Mean number of farm-related informational events, last 2 years	
-Field days or demonstrations	.40
-Advice from professional invited to land	.91
Experienced at least one farm-related info. event, last 2 years	
-Percentage who attended field days or demonstrations	16
-Percentage who got advice from a professional	32
Influence of other actors on decisions scales (5-point scale)	
-Other farmers	2.4
-Potential renters	2.8
-Bankers/lenders	1.5

Landownership motivation

Descriptive results for the second group of variables measure motivations behind land ownership (table 3). Average score on the environmental or recreational index was 9.4 out of 15. The average financial index score was 8.3 out of 15.

Table 3. Landownership motivation (n=239).

Mean importance of reasons for landownership indices (15-point)	
-Environmental or recreational	9.4
-Financial	8.3

Agroforestry knowledge and interest

Overall agroforestry knowledge among respondents averaged 1.8 on a five-point scale on which 1 corresponded to “very low” and 5 to “very high” (table 4). Reported knowledge of windbreaks was highest at 2.37, while knowledge of forest farming averaged only 1.52. With the exception of windbreaks, then, knowledge of agroforestry practices was very low on average, indicating that familiarity with agroforestry among respondents was low overall.

The dependent variable, overall interest in agroforestry for owned land, averaged 1.7 on a scale of four (table 4). In other words, most respondents reported that they were either uninterested or slightly interested. Seventy percent of respondents scored lower than two on the four-point scale, about 21 percent ranged between two and three (slightly-to-moderately interested), and only about four percent scored over three on the overall interest scale.

Table 4. Agroforestry practice knowledge and interest (n=239).

	Silvo- pasture	Riparian buffer	Alley cropping	Wind- breaks	Forest farming	Overall
Knowledge of practices (5-point scale)	1.55	1.93	1.64	2.37	1.52	1.79
Interest in practices (4-point scale)	1.68	1.79	1.46	1.82	1.67	1.68

Among individual practices, interest in windbreaks was highest, averaging 1.82, with 25 percent of respondents expressing that they were either moderately or very interested in the practice. Interest in riparian buffers followed closely at 1.79, and 27 percent of respondents were either moderately or very interested in that practice. Alley cropping garnered the lowest level of interest (1.46): only 15 percent of respondents expressed moderate to keen interest in this practice.

Regression Results

The OLS regression results for the model (table 5) indicate that it is significant ($F=7.838$, $p<.001$) and explains a substantial amount of the variation in overall interest in agroforestry (Adj. R square = .287).

Table 5. OLS regression of interest in agroforestry practices on selected independent variables.

	b	Beta	S.E.	Sig.
Constant	1.361	-.154	.295	.000
Farming participation (No=0)	-.219	.014	.080	.007
Years land in family	.000	-.052	.001	.813
Likelihood leave to family	-.026	-.126	.030	.381
Percent of land on crops	-.253	-.072	.127	.047
Influence of other farmers' opinions	-.045	.049	.039	.251
Influence of potential renters' opinions	.029	.124	.038	.452
Influence of bank/lender requirements	.097	-.058	.048	.046
Number of field days or demonstrations	-.035	.217	.036	.336
Number times advice from professional	.080	.294	.022	.000
Env/rec. reasons for owning index	.055	-.110	.012	.000
Financial reasons for owning index	-.025	.161	.014	.080
Knowledge of AF	.159	-.070	.063	.012
Age	-.004	.192	.003	.273
College graduate (No=0)	.278	-.154	.086	.001
F-value	7.838			
Adj. R Square	.287			
N	239			

One significant relationship emerged among the variables pertaining to the farming community: participation in farming is negatively associated with interest in agroforestry. That is, respondents who used to farm the land (or whose spouse farmed the land) or who had a family member farming the land expressed significantly lower levels of interest in agroforestry. This result appears to be in line with Raedeke et al. (2003) findings on the incompatibility between the habitus/field of farming and agroforestry. Perhaps people who have a stronger connection to the actual farming of their land have particular ideas about how it should be farmed, and agroforestry does not fit that mold. Actual participation in farming seems to be a much more important predictor than simple ownership continuity: neither length of family ownership nor likelihood of family inheritance were significantly associated with interest in agroforestry.

Among the community influence variables—the importance of other actors' opinions in decision making—only the banker/lender influence variable explained variance in non-operator landowner interest in agroforestry. Respondents who rated the influence of bankers or lenders on their land-use decisions as high also tended to express higher interest in agroforestry. This was an unexpected result, and it is not clear why this relationship was positive. One potential explanation could be that non-operator landowners who acquired their land more recently have both higher levels of debt and landownership motivations that are more compatible with the concept agroforestry. Further discussion of the relationship between ownership motivation and interest in agroforestry is found below.

Of the two information source variables, only the number of times the respondent received advice from a professional was highly significant. As noted above, there was some question as to how the wording of the question might influence the result. Given the strong positive relationship between this variable and interest in agroforestry, it is likely that a majority of respondents were referring to contacts with NRPs when answering this question. This result—that non-operator landowners who have had more contacts with NRPs are more open to the idea of agroforestry—was expected. Landowners generally must be seeking assistance on conservation issues in order to invite a natural resource professional onto their land. This indicates that agroforestry practices appeal to landowners who are already involved in environmental improvement efforts.

The results pertaining to farming orientation and landownership motivation suggest an interesting pattern. The relationship between environmental and recreational reasons for owning and interest in agroforestry was strongly positive. Financial motivation, on the other hand, was negatively associated with interest in agroforestry, though the parameter estimate was not significant at the .05 level ($p=.08$). Taken together, these results point to a divide between landowner types. Non-operator landowners who place greater importance on the aesthetic, natural and recreational value of landownership are more interested in agroforestry. For those landowners for whom financial considerations are paramount, agroforestry appears to be less attractive.

The significance of percentage of land in crops reinforces the above interpretation. Non-operator landowners who had a higher percentage of land in crops were considerably less likely to express interest in agroforestry. This result suggests that non-operator landowners may view row crops and trees as incompatible. Row crops are generally planted in the most fertile (and valuable)

ground, and landowners may simply have a difficult time imagining that alternative uses—particularly relatively unfamiliar ones such as agroforestry—would be more productive. A second source of incompatibility may be collective memory of the conversion of forested areas into cropland. As Raedeke et al. (2003, 72) put it, “...converting the land back to trees could be perceived as erasing an important symbol of previous generations and of a person’s family heritage.”

Finally, also consistent with expectations, both knowledge of agroforestry and level of education were significantly and positively related to the dependent variable. Landowners who know more about agroforestry practices are more likely to express interest in them for their land. This finding should be encouraging to agroforestry proponents given that the direction of the relationship could have been negative. Education level appears to be relevant, as college graduates tended to be more interested in agroforestry than their counterparts with a high school education or less. Age was not significantly related to the dependent variable.

DISCUSSION AND CONCLUSION

A number of conclusions can be drawn from the results of this study that are significant to the agroforestry community. First, even though overall level of interest was relatively low, non-operator landowners did express interest in implementing agroforestry practices on their land. While this study only measured interest in agroforestry rather than actual adoption, interest is a critical first step that signals openness to the idea of agroforestry.

Perhaps the most striking conclusion that can be drawn from this research is how differences in farming orientation may affect non-operator landowner interest in agroforestry. The results indicate that non-operator landowners with closer ties to farming and stronger financial motivations for landownership are less interested in agroforestry. It is likely that efforts to promote agroforestry among such landowners will hinge on economic performance rather than environmental or social considerations. A number of articles in *Agroforestry Systems* have called for more intensive efforts to demonstrate and quantify the financial benefits of agroforestry (e.g., Mercer and Miller 1998) and additional research on markets for agroforestry products (e.g., Gold et al. 2004). Our findings further highlight the importance of such efforts to reduce uncertainty and increase interest in agroforestry practices.

On the other hand, the findings point to opportunities for agroforestry promotion among non-operator landowners who place high importance on the environmental and recreational values of their land. People who have purchased land in rural areas for (perhaps future) retirement, people who earn their living in urban areas and inherit land, people who purchase working farms for hunting purposes, and others who do not necessarily depend on their land for the bulk of their livelihoods may give environmental, aesthetic, and recreational factors more weight than financial ones when making land-use decisions. Such landowners represent a potential pool of interested (and deep-pocketed) partners in the effort to get agroforestry on the land.

The finding that number of contacts with NRPs is associated with higher interest in implementation of agroforestry practices is also a potentially important one. Non-operator

landowners in our study areas who have worked with NRPs are clearly open to the concept of agroforestry. Past research has shown, however, that NRPs lack knowledge of agroforestry and rarely promote it (Workman et al. 2003). If interest in agroforestry among non-operator landowners who work with NRPs is to be translated into implementation of practices, further efforts to increase agroforestry knowledge and comfort level among NRPs may be needed.

Overall, the results of this study suggest that more extensive outreach efforts specifically targeting non-operator landowners may be warranted. It is important to keep in mind that non-operator landowners do not always have a dominant influence over the selection of agricultural activities on their land (Constance, Rikoon, and Ma 1996). Nevertheless, it is likely that non-operator landowner influence will be significant for decisions involving agricultural practices with longer benefit horizons. Given that a large and growing proportion of farmland is owned by non-operator landowners, a failure to concentrate some research and outreach effort on this group could result in lost opportunities to encourage agroforestry adoption.

ACKNOWLEDGEMENTS

This work was funded through the University of Missouri Center for Agroforestry under cooperative agreements 58-6227-1-004 with the ARS and C R 826704-01-2 with the US EPA. The results presented are the sole responsibility of the authors and/or the University of Missouri and may not represent the policies or positions of the EPA. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the US Department of Agriculture.

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