Chapter 6
Plant Selection

Abstract This chapter discusses plant selection. The Grain for Green promotes the planting of either economic trees (trees from which a regular income may be obtained from the sale of non-timber products, such as fruits), ecological trees (trees that may be logged), or grassland. More farmers prefer to plant economic trees, because they generate higher and more regular incomes than ecological trees. However, the national standard is for ecological trees to make up 80 % of the total, and this is generally adhered to. In many places, farmers also claim that they do not have a choice of which plants to grow, but can only select from a few species.

Keywords Economic trees • Ecological trees • Tree species • Grass • Survival rate • Land ownership • Tree ownership

Introduction

The Grain for Green program promotes the growth of three categories of plants: economic trees, ecological trees, and grassland. The distinction between these three plants is important because the three kind of plants command different levels of subsidies, for a different period of time. The plants also generate different levels of income for the farmers. First, we introduce the different kind of plants supported by the GfG, discuss their characteristics and the prevalence of different forest types. Second, we discuss the survival rate of different species, and the rules regarding survival rate and subsidy payments. The survival rate of the trees is officially very high, but many scholars have questioned the reliability of the official data. Third, we discuss the reforms that have taken place concerning land and tree ownership, and the importance of these reforms for the GfG.

Plant Type

The GfG supports the regeneration of the original vegetation, which can be either grassland or trees. The trees planted can be either economic trees or ecological trees. Economic trees are those from which a sustainable income can be generated,

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for example, through the sale of non-timber products such as tea, fruits, or nuts. These cannot be cut unless they stop producing marketable products, in which case they can be replaced with other economic trees (Li 2002). In contrast, the goal of ecological trees is to reduce soil erosion and sandstorms (Li 2001, 2003). Ecological trees (which include such species as fir, cedar, and other coniferous trees) may be logged, subject to quota and forest officers' approval (Delang and Wang 2012).

There are official standards for ecological and economic trees. In particular, the local forestry bureaus have lists of trees that may be planted with the financial support of the GfG, and usually each village has only a few species to choose among. The list of ecological trees includes 142 species in the southern region and 103 species in the northern region, while the list of economic trees includes 41 species in the southern region and 28 species in the northern region. Some tree species (such as walnut, chestnut, and tea) are included in both categories. Therefore, it is sometimes not possible to tell from the tree species whether the area has been planted with ecological or economic trees. There are also strict planting standards, including the density with which plants can be planted, rules to avoid soil erosion (such as planting hedges), the use of mulch, the frequency of weeding, and the areas that may be reclaimed. When ecological and economic trees are planted, some original trees may be cut to improve the ability of the new trees to prevent soil erosion (MOYN 2009: 141–151).

When the government designed the program, it was stipulated that in every administrative unit 80 % of the trees should be ecological trees and 20 % should be economic trees. This limit exists because economic trees, compared to ecological trees, require more frequent replanting and provide (in some cases) fewer environmental services. More frequent replanting may compromise the primary objective of the program: reducing soil erosion (Uchida et al. 2005).

However, this rule was not always enforced, as farmers preferred to plant economic trees rather than ecological trees (Cui 2009; Bennett et al. 2011). Farmers prefer economic trees because they can earn higher incomes from their fruits and other non-timber products, then use or sell the wood (from thinning) and timber, which may be harvested when fruit trees stop producing. Wang and Maclaren (2011) directly addressed farmers' preferences for particular tree types, through a survey in Dunhua County (Jilin province). They found that the design of the GfG did not reflect the needs and attitudes of the residents, with 66 % of survey respondents stating that their priorities differed from those of the government. Given the choice, 40 % of the farmers would have preferred to plant economic trees; 26 % of the farmers would have opted for "timber trees" (by which they presumably mean ecological trees) and 31 % favored ecological trees, bringing the total number of farmers who wished to grow ecological trees to 57 % – well below the government target of 80 %.

Similar findings were reported by Uchida et al. (2005), who evaluated the future profits of GfG plants, using a survey conducted in 2,000 among 144 participating households from 16 randomly selected villages in two provinces, Ningxia and Guizhou. While the actual implementation in Guizhou was consistent with the government's requirement, the survey shows that more than 50 % of households

Table 6.1 Percentage of ecological forest area converted from cropland

Year	Ecological forest (%)
2002[a]	93.42
2003[b]	79.91
2004[b]	80.84
2005[b]	83.64
2006[b]	79.64
2007[b]	86.22

Source: [a]Data from 50 sampled counties (SFA 2003d); [b]National data (SFA 2003–2008)

stated that they would have preferred to plant economic trees (Uchida et al. 2005). Uchida et al. (2005) argued that if farmers had been allowed to plant economic trees, not only would they have had greater incentives to manage the trees more intensively, but they would also have been able to create an alternative income source that could reduce the propensity for reconversion when the subsidies end. Because of the high proportion of relatively economically, non-productive ecological trees, there may be a greater danger of reconversion in the future when program payments cease. Indeed, according to Li (2009b) the question remains as to whether in the long run, most species will generate sufficient economic returns, so that the removal of the subsidies will not alter the future financial situation of the farmers.

According to Ke (2007), if economic forests exceed 20 % in the targeted area, there would be no grain and cash subsidy paid for the additional trees. This may have contributed to government regulations being followed. Between 1999 and 2003, the program converted 914,500 ha of cropland and afforested 925,000 ha of land. Of the converted lands, 85.29 % were converted to ecological trees (Trac et al. 2007). Table 6.1 also shows that, from 2003 to 2007, ecological trees were often planted more frequently that the government had stipulated, although some species are classified as both economic and ecological trees, which makes reading such statistics more difficult.

Low Diversity of Tree Species

Vegetative cover and forested area have increased considerably thanks to the GfG. However, the ecological efficiency of the GfG is often criticised on two grounds:

1. The species planted are very often not natives to the areas in which they are planted.
2. The choice of tree species depends to a large extent on the climate and soil conditions, which vary greatly in mountainous area. The specific species planted do vary among different townships, but there is very little diversity of tree species planted in each particular township, with excessive emphasis on a very small number of species, effectively creating monocultures.

Table 6.2 Tree plantation areas of sampled peasant households in Liping

Tree species	Area (ha)
Chinese fir	66.68
Masson pine	51.37
Bamboo	31.31
Pear	8.63
Tea	7.77
Orange	5.19
Oil teaseed	5.91
Tuliptree and hackberry	4.69
Sawtooth oak	3.68
Chestnut	1.78
Wild pepper	0.82

Source: Zhou et al. (2007)

The literature abounds with examples of limited diversity in the number of species introduced by the GfG. For instance, in Dunhua county in southeastern Jilin Province, 96 % of the trees were Olga Bay larch (*Larix Olgensis Henry*). In Jiangxi Province, 60 % of the converted land in 2006 was planted with Oil Camellia. In Henan Province during 2000–2005, poplar accounted for 40 % of the reforested area, whereas other ecological tree species accounted for less than 2 %, and fruit trees were planted on the remaining area (Liu et al. 2008). Similarly, Zhou et al. (2007) surveyed the tree species planted in Liping County (Guizhou province), and found concentrations of a few species, with Chinese fir planted on 36 % of the land, Masson pine on 27 %, and Bamboo on 17 %. Another eight species shared the remaining 20 % of the reforested area (Table 6.2). Hong and Li (2000) surveyed the vegetation introduced through the GfG in Yulin County (Shaanxi province). They identified five species in Y village, three of which were ecological trees (Chinese arborvitae (*Platyclaudus orientalis*), Pea tree (*Caragana psammophyla*) and Chinese pine (*Pinus tabulaeformis*), and two of which were economic trees (Chinese jujube (*Zizyphus jujuba*) and Chinese apple (*Malus pumila*)).

GfG-supported reforestation is less diverse than the local forest, or even abandoned farmland. A survey in five randomly selected counties (Jingbian, Ansai, Baota, Yanchang, and Luochuan) in northern Shaanxi Province suggested that the number of plant species in plots where cultivation was abandoned was of 21–31 species, compared with a range of 9–14 species in the afforestation plots (Cao et al. 2009a).

The low species diversity of GfG planted forests may call into question the ecological success of the GfG. Forests may not be sufficiently diverse to support a diverse wildlife. Also, the monoculture is vulnerable to ecological disasters because of high exposure to the possibility of pests or fires (Wang and Maclaren 2011). On the other hand, one should acknowledge that low species diversity makes it easier for the farmers to take care of the trees. Low species diversity also helps the farmers generate higher economic returns due to economies of scale, which encourage them to look after the trees.

Choice of Vegetation: Trees Versus Grass

Another criticism made about the GfG is that, in contrast to its enthusiasm for planting trees, the MOF, which is in charge of implementing the program on behalf of the central government, has shown less interest in other measures, such as grassland recovery, terracing, the construction of check dams, or other engineering measures, even if they are better suited in certain environments (Yin et al. 2013). As stated by the Forest and Grassland Taskforce of China (2003, p. 3):

> Implementation regulation has not been tailored to local conditions, and there has been an overemphasis on tree planting rather than restoring original vegetation cover. The SLCP does not give sufficient consideration to the ecological and economic functions of grasslands in semi-arid areas and the need to restore these ecosystems.

Populus is a species commonly used by the GfG, but it has been singled out as inadequate, specially in arid or semiarid areas. Observers have voiced their concern that planting poplars as a major species for forestation in arid and semiarid regions is problematic, given the limited precipitation. Populus is a fast-growing species with low water-use efficiency. It is hard to establish the trees in many conditions and wherever they are established, their deep root system can haemorrhage ground water through transpiration, lowering the water table and making it harder for native grass and shrubs to survive (Normile 2007). Many studies have reported that when the consumption of rainwater by tree plantations is higher than the level of consumption by natural vegetation, increased forest cover reduces the net runoff from a watershed (Cao et al. 2007a). Research in northern China (Wang et al. 2003) revealed that the runoff from afforestation plots decreased by an average of 77 % (ranging from 57 to 96 %) compared with grassland and farmland. Although this decreased runoff suggests increased retention of precipitation and decreased water erosion, the retained moisture is often used more rapidly than it can be replenished during the rainy season. As a result, the trees actually decreased the below ground water supply and the supply of water to rivers. Further, any soil conservation achieved by the trees was subsequently offset by more severe wind erosion (Cao 2008). Since 1949, the overall survival rate of trees planted during afforestation projects has been only 15 % across arid and semiarid northern China (Cao 2008).

Survival Rate of Plants

Official figures commonly place, survival rates above 90 %, and even reach 100 %. These data are unrealistic when compared to normal survival rates from plantations. There may be two reasons for such a high percentage: First, local Forest Bureau officers may falsify the data to improve their performance. Second, farmers can replant every tree that has died and receive compensation retroactively. Compensation is conditional on the growth of the forest. Officers from the Forest Bureau verify the survival rate of the trees and the farmers must achieve a survival rate of 70 % (in the Yellow River watershed) to 85 % (in the Yangtze River watershed), now revised to a nation-wide standard of 75 %, to receive compensation (Bennett 2008). Farmers who do not achieve a survival rate of 70–85 % are allowed to replant the seedlings, and if the seedlings have survived when the officers from the Forestry Bureau inspect the fields the following year, the farmers are paid retroactively (for the previous year and the present one) (State Council 2007). The fact that the farmer can replant every tree that has died, and receive compensation retroactively, pushes the survival rate much higher.

Studies have shown that, in reality, survival rates are often below the government-stipulated level. Li (2009c) found that the survival rates of trees in many of the townships he surveyed were well below the standard stipulated by the government. Similarly, Bennett (2008) argued that the survival rates of planted trees in many of the townships in his dataset fell below those stipulated for subsidy delivery, although the low survival rates generally did not result in withholding subsidies. As Zuo et al. (2003) and others have observed during the pilot phase, program managers were faced with a dilemma when deciding whether to withhold subsidies, because of the program's dual goals of environmental restoration and poverty reduction. On the one hand, withholding subsidies based on low survival rates could dampen enthusiasm in the program, and reduce the number of people willing to participate. It would also harm the welfare-enhancing objective of the program. On the other hand, delivering the subsidies without adhering to the standards of compliance would encourage poor implementation by the farmers. Indeed, the failure to enforce the rule regarding no payment for low survival rates, could result in a vicious circle, which would lead to gradually lower survival rates.

To examine the determinants of survival rates of program-planted trees and grasses, Bennett et al. (2011) used a 2003 survey that collected household and plot-level data during and just after the pilot-phase of the program in the three initial pilot provinces: Shaanxi, Gansu, and Sichuan.[1] This dataset is used to examine the factors affecting the survival rates of program planted trees and grasses at the time of the first inspection. Figure 6.1 and Table 6.3 present the sample distribution of survival rates and tree/grass types. Survival rates in the Yellow River watershed area sample were mostly above the level stipulated by the government for the provision of subsidies (70 % of planted trees and grasses in the Yellow River watershed or north China), but in the Yangtze River watershed area it was often below the rate stipulated by the government (85 % survival rate in the Yangtze River watershed and south China) (SFA 2001a). As mentioned, more recently the survival rate required to obtain subsidies has been revised to a nationwide standard of 75 % (Bennett 2008).

Table 6.4 presents descriptive statistics regarding survival rates, tree and grass types planted, and enrolled area. Crops planted on the plots are grouped according to the Ministry of Forestry's program categories of "grasses", "economic forests" (orchard crops or trees with medicinal value) and "ecological forests" (timber crops)

[1] In 1999 and 2002, the survey collected detailed data for 360 households (including GfG participants and non-participants) in 36 participating villages on various household characteristics, off-farm income sources, plot-level agricultural inputs and outputs, husbandry and sideline activities, fixed and productive assets, and savings and credit. In total, 455 enrolled plots (of 246 participant households) were inspected at least once, and survival rate data were recorded (Bennett et al. 2011).

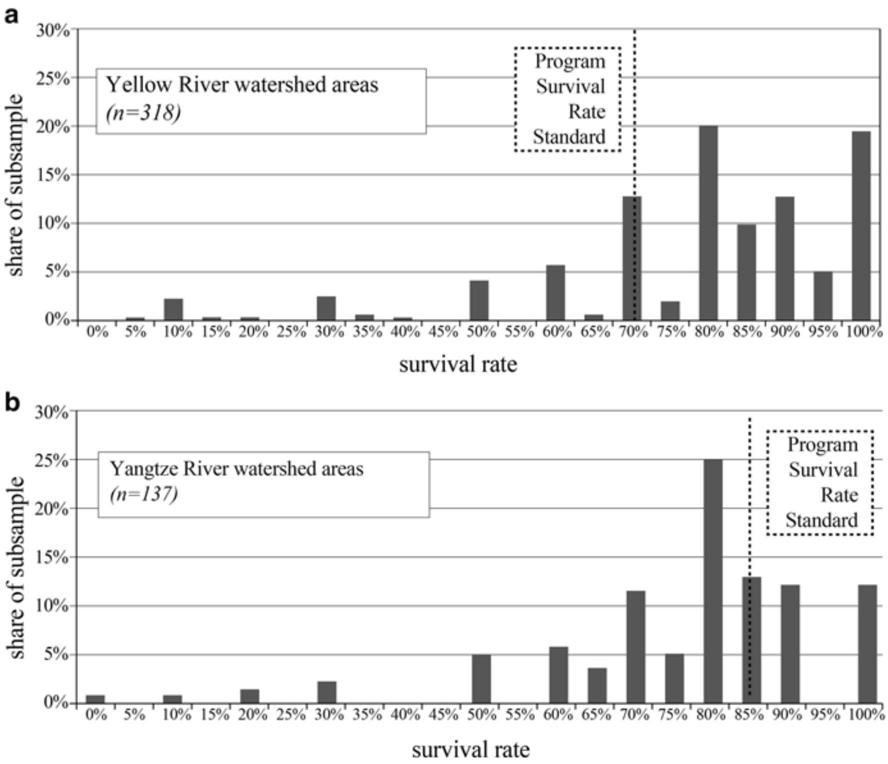

Fig. 6.1 Histogram of sample survival rates, first inspection (Source: Bennett et al. 2011)

(Bennett et al. 2011). As Table 6.4 suggests, mean survival rates are not statistically different between "ecological forests" and "economic forests", while survival rates for trees are lower than those for grasses, significant at 1 % (Bennett et al. 2011).

In order to further examine the dynamics of tree survival, Bennett et al. (2011) developed a Tobit model with a number of different variables. Survival rates on first plots initially declined as the first trees succumbed. However, survival rates improve roughly 1 year into the program, as might be expected under a learning-by-doing scenario with replanting. Moreover, with the exception of the first 3 months of the program, survival rates on first plots are much lower than those of subsequently retired plots (Fig. 6.2) (Bennett et al. 2011). These results imply that it is important for each household to enter the program gradually, rather than being asked to retire a large portion of their land at the outset. They also suggest that agricultural extension programs need to accelerate the learning process, so that program benefits are delivered sooner (Bennett et al. 2011).

Bennett et al. (2011) found that households with higher cropping and husbandry income per capita also have higher tree survival rates. This suggests that households with higher agricultural labor productivity also perform better in forestry and horticulture.

Table 6.3 Average survival rate of trees planted under the GfG (percentage)

Province	County	Township	Govt. standard (%)	Inspections		
				1st (%)	2nd (%)	3rd (%)
Shaanxi	Yanchuan	Yanshuiguan	70	94.2	93.6	98
		Majiahe		72.9	95.8	96.4
		Yuju		79	83.2	95
	Liquan	Yanxia		56.3	86.8	81.1
		Jianling		78.8	47.9	39.4
		Chigan		100	46.7	52.1
Gansu	Jingning	Zhigan	70	70	69	66
		Gangou		80	76.6	71
		Lingzhi		–	75.7	77.7
	Linxia	Zhangzigou		56.3	46.7	65
		Tiezhai		90	61.1	75.8
		Hexi		87.5	69.5	64
Sichuan	Chaotian area	Datan	85	82	61.5	67.3
		Zhongzi		70	48.7	77
		Shahe		92.5	74.1	40.4
	Li	Shangmeng		100	79.6	76.1
		Puxi		74.9	80.7	84.8
		Guergo		70	74.1	77

Source: Bennett (2008)
Note: The data are based on a 2003 household and village-level survey conducted by the Center for Chinese Agricultural Policy

Table 6.4 First inspection survival rates of program-planted trees and grasses

Tree types	Survival rate, first inspection		Share of enrolled area in sample (Total 89.7 ha)
	Mean	Std (%)	(%)
Grasses	88.1	18.7	11.4
Alfalfa	93.5	9.5	5.3
Ryegrass	100		0.1
Chinese Toon (an herb)	65.0	25.6	1.8
Other grasses	96.3	10.6	4.4
Economic forests	75.9	21.7	63.6
Apple	76.7	11.5	1.0
Pear	61.0	35.5	1.1
Almond	77.9	19.7	19.3
Peach	72.2	17.4	6.6
Jujube	75.8	28.7	20.7
Prickley ash	76.7	19.7	7.3
Ginko	86.7	15.3	1.2

(continued)

Table 6.4 (continued)

Tree types	Survival rate, first inspection		Share of enrolled area in sample (Total 89.7 ha)
	Mean	Std (%)	(%)
Sumac	65.0	7.1	0.2
Mulberry	78.8	18.9	1.4
Sandthorn/Sea Buckthorn	75.2	13.3	3.6
Guava	50.0		0.1
Persimmons	30.0		0.2
Plum	91.0	5.7	0.5
Chinese arborvitae	80.0	0	0.3
Ecological forests	75.7	22.4	25.0
Black locust	77.8	17.7	14.1
Cypress	83.1	17.9	2.6
Willow	87.2	8.8	1.5
Japanese blue oak	100.0		0.0
White poplar	61.3	32.7	1.5
Fir	52.0	43.1	0.7
Spruce	85.0		0.1
Horsetail pine	60.8	30.9	1.5
Chinese ash	50.0		0.1
Japanese black pine	78.0	11.4	1.4
Other tree types	84.0	19.2	1.3

Source: Bennett et al. (2011)

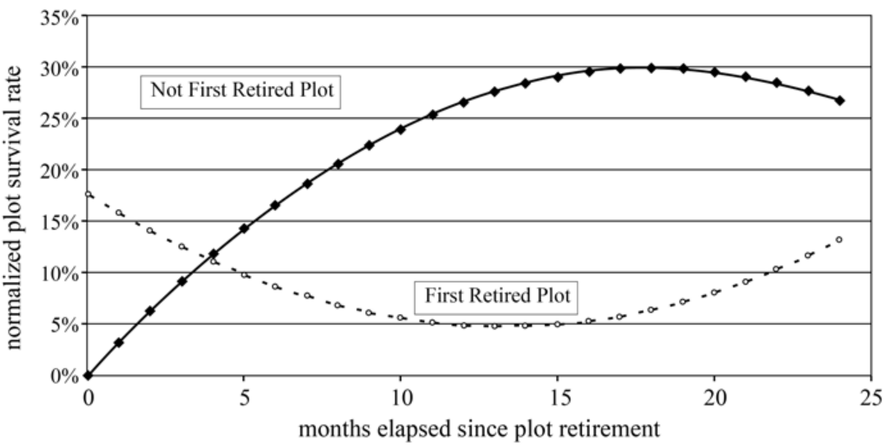

Fig. 6.2 Estimated dynamics of survival rates (Note: Normalized survival rates are estimated from the Tobit model and are defined to be zero at the time of retirement for plots belonging to experienced households. Source: Bennett et al. 2011)

Bennett et al. (2011) also found that, perhaps contrary to expectations, the survival rates of plants by farmers who join the program voluntarily are similar to those who were instructed to do so by village leaders. This result offers two potential interpretations. It might mean that voluntarism has no particular impact on tree survival. Or it might mean that households that said they could choose whether to participate in the program, do not have substantially different rights from those who said they did not have a choice. This would occur if leaders were hesitant to press unwilling households into joining the program, or if households were reluctant to make decisions that would displease leadership (Bennett et al. 2011).

On the other hand, Bennett et al. (2011) argued that farmers who are permitted to choose what types of trees to plant obtain significantly higher survival rates – around 9 % higher. This result is obtained despite controlling for the types of trees planted, so the higher survival is not due to farmers selecting hardier ones. Rather, it implies that farmers who choose to plant a particular tree species are better able than the village leader to select tree-types that are more likely to survive, given plot characteristics and household constraints. Also, it is very likely that when farmers have the autonomy to choose what to plant, they have an increased propensity to invest effort and money into sustaining the plantation (Bennett et al. 2011).

Table 6.5 provides evidence in support of these interpretations. It shows that households with the right to choose what species to plant generally invest considerably more cash and labor on the plots they retire. These results suggest that farmers who can choose what to plant are more invested in the success of the retired land. This in turn suggests that granting farmers the right to choose the species is likely to align their interests more closely with the environmental goals of the program (Bennett et al. 2011). Table 6.5 also shows that, given a choice, farmers opt to grow economic trees, rather than ecological trees. This tendency is statistically highly significant, and likely the result of the fact that households derive economic benefits from economic forests much sooner (Bennett et al. 2011). The result carries two possible interpretations. First, the difference between the subsidies paid for ecological and economic forests is smaller than the difference in the external benefits yielded by each (Bennett et al. 2011). If this is true, authorities should consider extending subsidy lengths for ecological forests or reducing those for economic forests. In other words, on granting farmers property rights that will permit them to respond to price signals, the government's role is to get those prices right (Bennett et al. 2011). Second, the difference in the net private benefits of planting economic and ecological forests is larger than the government expected. In this case, the government should lower the targeted share of ecological forest.

While permitting farmers to choose the types of tree increases the plants' survival rate, Bennett et al. (2011) found that when farmers chose which plots to retire, the survival rate is lower than when it is the village leader who chooses the plots. This result is perhaps surprising, as farmers with the right to select plots might have been expected to be more invested in tending them. Bennett et al. (2011) hypothesise that since the subsidies paid by the GfG were comparable to, if not larger than, the net yields from the retired plots, farmers may be willing to take risks, and convert more land than they can properly manage.

Table 6.5 Variations in key variables with program implementation rights

Plot-level comparisons		Household has the right to choose what to plant?			Household has the right to choose the plot?		
		No	Yes	Ho: invariance with regard to autonomy (p-value)	No	Yes	Ho: invariance with regard to autonomy (p-value)
Tree/grass type	Economic forests	58.8 %	72.3 %	0.02	62.8 %	65.6 %	0.18
	Ecological forests	32.5 %	20.5 %		27.2 %	29.9 %	
	Grass	8.7 %	7.2 %		10.1 %	4.5 %	
Post-enrolment labor inputs on plot (labor days/ha)	1st year	155	273	0.01**	192	209	0.73
	2nd year	96	146	0.20	106	132	0.51
	3rd year	65	145	0.08*	107	81	0.57
	4th year	65	101	0.15	96	68	0.26
Post-enrolment cash inputs on plot (Yuan/ha)	1st year	256	544	0.04**	282	512	0.10
	2nd year	75	164	0.02**	109	108	0.96
	3rd year	98	139	0.32	124	100	0.56
	4th year	154	155	0.99	103	207	0.21

Source: Bennett et al. 2011
Note: $^{**}p<0.05$, $^{*}p<0.1$

Land and Tree Ownership

For both types of forests, land ownership is guaranteed during the contract period, and the planted trees or grasses also belong to the households that own the land. The turning point for collective forest management occurred when the government issued the "Decision on Some Issues Concerning Forest Protection and Forestry Development" in 1981. This decision included three major components (Démurger et al. 2009):

1. The stabilization of forest tenure through property certificates provided to owners,
2. The distribution of use rights to rural households on non-forested land (know as "family plots"),
3. The introduction of a forestry Contract Responsibility System that gave households land-use rights on collective forest lands (know as "responsibility lands") (Démurger et al. 2009).

At the household level, family plots and responsibility lands are the two main forms of forest tenure. Tenure is guaranteed for all land converted by the GfG, regardless of whether or not they are family plots. Since 1981 land can be inherited, and since 1998 farmers can also “transfer” (i.e. sell) their forestland to other farmers, through direct sale, auction or lease.[2] Only forestland can be transferred, not farmland or buildings. The name of the farmer who purchases the land is recorded in the local Forestry Office (for forestland), the Municipal Land and Resources Bureau (for wasteland) or any other department or office that used to own the land. The buyer is thereafter recognised as the new owner of the land.[3]

Since 1981 farmers also have greater control over land products, such as wood, that they can sell for a profit and retain the proceeds. Special regulations also exist regarding the trees planted through the GfG. Planted trees cannot be cut down during the period of compensation. When the cash and grain subsidies expire, those who converted their farmland to forests may, upon approval of the relevant departments, harvest the trees on their land, provided that such harvesting does not cause damage to the overall ecological system. However, household-level decision-making and management rights on trees are not fully guaranteed, because tree harvesting is still subject to the approval of local forestry bureaus. The Forest Law of 1984 also established a system of state-determined timber harvest quotas, which means that a household has to apply to the local government for a quota in order to cut trees on its land. The quota system is still in force today, and strongly reduces the degree of autonomy available to farmers regarding the sale of timber (Delang and Wang 2012). Thus, in practice, the government will continue monitoring and regulating tree felling.

Bennett et al. (2011) found that land rights do matter in the rates of survival of trees and grasses. Their findings were consistent with those of Grosjean and Kontoleon (2009), who found that greater land tenure security over enrolled land could increase labor inputs. In particular, using a Tobit model, Bennett et al. (2011) found that survival rates on private land were on average 23 % higher than on contract land (chengbao tian), which was auctioned off or allocated by village leaders for a fee. Similarly, their statistical analysis of 455 enrolled plots could not convincingly reject the null hypothesis that trees grown on private and responsibility land (i.e. collective forest land) have equal survival propensities (the null hypothesis carries a p-value of 0.058), with an estimated difference in survival rates of 19 %.[4]

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[2] More specifically, people classified as “rural dwellers” in their household registration system (*hukou*) could sell it to other “rural dwellers”.

[3] In some respects, China wants to continue considering itself a socialist country, and the private ownership of land is still considered anti-socialist. All land in China belongs to the government. There is no English word to reflect the kind of tenureship enjoyed by Chinese peasants, since people are, in fact, granted a range of rights that exceed the usual understanding of “tenureship”. These rights have kept changing with the passage of time. For simplicity, in this book we will state that farmers “own” the land.

[4] Bennett et al. (2011) acknowledged that there are only six private plots in the sample, so that even though the large survival rate differences result in low p-values, larger datasets that may stratify on land rights and retirement status would be required before conclusions can be drawn on the effects of land rights. That the responsibility land variable is statistically insignificant could also be due to the noisy signal it provides regarding actual rights over a given plot.

Given that agricultural yields are substantially lower on contract and responsibility land, these results imply that retiring contract land (the omitted category) or responsibility land while also granting the household secure, long-term tenure on it, might do a great deal to boost survival rates without significant loss of agricultural production (Bennett et al. 2011). Bennett et al. (2011) acknowledged the possibility that contract and responsibility lands were lower in quality, in which case the regression results provided an upward-biased estimate of the impact on survival of granting private land rights. However, the authors contended that this omitted variable bias was unlikely to fully account for the different levels of output.

Conclusions

This chapter has reviewed issues related to the plants promoted by the GfG: economic trees, ecological trees, and grass, and discussed the survival rate of the trees. The survival rate of the trees is often well below the minimum stipulated for subsidy delivery, even though official data show a survival rate of between 90 and 100 %. However, one should recognise that even survival rates of between 60 and 70 % are relatively high. Most farmers prefer to plant economic trees, since they can obtain relatively high, annual benefit from the sale of non-timber products, such as fruits. If the trees stop producing fruits, the trees can be cut and the timber sold. Meanwhile, ecological trees can only generate limited incomes through the sale of wood from thinning, and the farmers have to wait many years before they can fell the trees and sell the timber. In addition, the sale of the timber is not guaranteed; farmers have to apply for a logging quota from the Forestry Bureau; they may have to wait several years before they are allowed to log their trees; or, they may receive a permit to cut only a small fraction of the total they applied for, which makes the logging uneconomical. In spite of this preference for economic trees, in most places the national standard of 80 % of the land being reforested with ecological trees is respected or exceeded.