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# Limited Impact of Biomass Crop Assistance Program (BCAP) Under Current Funding Levels

**Ruiqing Miao and Madhu Khanna**

**Department of Agricultural and Consumer Economics**
**University of Illinois**

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Established in the 2008 Farm Bill and re-authorized in the 2014 Farm Bill, the Biomass Crop Assistance Program (BCAP) aims to promote biomass production for bioenergy and bio-products by providing growers and bio-refineries with subsidies for biomass production. Total budget for the BCAP is limited to $125 million over 2014-2018 by the 2014 Farm Bill and can be used to make matching payments, establishment cost-share payments, and annual payments. Matching payments, in order to assist producers with the cost of collection, harvest, storage, and transportation of biomass to a conversion facility, provide a 1:1 matching for prices that a bio-refinery pays to growers. The matching payments are up to $20 per dry ton and two years for a producer. Furthermore, the BCAP limits the amount of matching payments between 10% to 50% of the total BCAP budget. Establishment payments and annual payments of the BCAP are limited to dedicated energy crops within a project area, a USDA-approved area where biomass producers commit to supplying biomass to biomass conversion facilities. Establishment payments are limited to 50% of the establishment costs of an eligible crop or $500 per acre, whichever is lower. Annual payments, up to five years for herbaceous biomass and up to 15 years for woody biomass, cover the foregone returns due to converting land from its previous use to an energy crop.

Under current total budget and limitations for the three types of payments, the BCAP has only nominal impact on incentivizing biomass production, especially for biomass from perennial crops such as miscanthus and switchgrass. As evidenced by current BCAP facilities reported by Farm Service Agency of the USDA (available here), all of the conversion facilities use agricultural or forest residues as feedstock. Since residues are not eligible for establishment and annual payments, most of BCAP outlay at current stage is under the matching payment category. Agricultural residues, such as corn stover, however, have low yield and their removal may have negative impacts on soil organic matter and erodibility (Dwivedi et al. 2015). On the other hand, perennial dedicated energy crops such as miscanthus and switchgrass can be high-yielding and can be grown on marginal lands, providing a range of environmental benefits (Hudiburg et al. 2016).

However, perennial crops typically require a one- to three-year establishment period and a large amount of up-front establishment costs with possibility of establishment failure. Therefore, growers who dislike risky and delayed returns will need additional incentives to produce biomass from perennial crops instead of residues. Establishment cost subsidy and annual payments in the BCAP have the potential to address the challenge of risky and delayed returns imposed by perennial crops. A recent study by Miao and

Khanna (2017a) shows that the optimal establishment cost subsidy rate for minimizing the total costs (private sector costs plus government subsidy costs) for providing a certain amount of biomass from a perennial crop is about 100% of establishment costs under various assumptions about farmers' risk and time preferences as well as credit availability. However, the current BCAP only allows 50% of establishment costs to be subsidized with a cap at $500/acre. This limited amount of establishment cost subsidy restrains the effect of BCAP on biomass production from perennial crops.

Moreover, the BCAP is severely constrained by its overall budget. A study by Miao and Khanna (2017b) shows that under the current $125 million budget, the BCAP will only increase total biomass production by up to 2.7 million metric ton per year. The largest impact occurs when biomass price is low, at $40/metric ton, and when growers have higher risk aversion, higher discount rate for future returns, and credit constraint. The impact of BCAP will be smaller when biomass prices are either higher or lower than $40/metric ton, indicating an inverted U-shape relationship between the impact of BCAP and biomass price. They also show that when biomass price is about $40/metric ton then BCAP primarily incentivizes corn stover and 50% of the BCAP budget is used for matching payments to corn stover producers.

With a limited budget there is likely to be more acres that are willing to enroll in BCAP but unable to do so due to limited funding. Although the BCAP does specify a few factors to be considered when selecting project areas into the program, such as potential biomass volume and the economic and environmental impacts of biomass production, it does not provide specific criteria for selecting project areas to enroll in the program. Furthermore, with multiple criteria, the program does not state the weight to be assigned to the various factors and the trade-offs that will be considered acceptable when choosing among project areas that differ in the potential impacts. Studies have shown that selection criteria are critical in enhancing efficiency of a program whenever the program's budget is limited (Miao and Khanna 2017b; Miao et al., 2016). For BCAP, Miao and Khanna (2017b) examine two alternative land selecting mechanisms: incremental biomass production maximizing (IBP-Max) mechanism under which areas with larger additional biomass production induced per dollar of BCAP payment will have higher priority to be enrolled; and cost of production minimizing (COP-Min) mechanism under which areas with lower production cost per ton of biomass have higher priority to be enrolled. They find that BCAP's impact under the two mechanisms differ significantly, with biomass increase under the IBP-Max mechanism is much larger than that under the COP-Min mechanism. In addition the two mechanisms, other mechanisms such as maximizing acreage enrolled under BCAP, maximizing biomass volume covered under BCAP, or mechanisms that take into account biomass varieties may be worth investigating.

In sum, the aggregate impact of the BCAP under existing funding levels on biomass production is expected to be only nominal. Moreover, the program's restrictions on establishment payments and annual payments will limit its capability to incentivize perennial biomass production. To encourage producers' investment in perennial crops which have high yields and positive environmental impacts, BCAP in the next farm bill should have an increased budget, a higher subsidy rate for establishment costs, and less percentage of funds allocated to the matching payments. Additionally, the impact of the program would increase if an efficient selection mechanism for enrolling land in the program was clearly specified.

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