Table 4. Itemized average cost table for biomass plantation establishment, management, and harvesting in the Northern Great Plains region. Modified and updated from Manatt et al. 2013.

Northern Great Plains Region	Unit	Mean Cost ($)	year(s) of activity	Discounted cost per acre (@4%)	Discounted cost per acre (@5%)	Discounted cost per acre (@6%)	Discounted cost per acre (@7%)
Machinery [1]							
Tree planting (bareroot/cutting)[2]	tree	$0.14	1	$366.56	$363.07	$359.64	$356.28
Chisel Plow	acre	$12.59	0	$12.59	$12.59	$12.59	$12.59
Tandem Disk	acre	$14.25	0	$14.25	$14.25	$14.25	$14.25
Ground Sprayer (pre-emergent)	acre	$10.94	1	$10.52	$10.42	$10.32	$10.22
Boom Sprayer (post-emergent)	acre	$7.35	0	$7.35	$7.35	$7.35	$7.35
Forage Harvester (poplar)	acre	$211.01	3,6,9,12, 15	$752.00	$752.00	$598.00	$598.00
Fertilizer spreader	acre	$14.52	1	$13.96	$13.83	$13.70	$13.57
Forage wagon (biomass hauling to onsite storage)[3]	acre	$35.86	3,6,9,12, 15	$128.00	$128.00	$102.00	$102.00
Inputs [4]							
Princep (pre-emergent herbicide)	pint	$3.75	1	$3.61	$3.57	$3.54	$3.50
Goal (pre-emergent herbicide)	pint	$8.90	1	$8.56	$8.48	$8.40	$8.32
Stinger (post-emergent herbicide)	pint	$59.54	1	$57.25	$56.70	$56.17	$55.64
Poast (post-emergent herbicide)	pint	$11.32	1	$10.88	$10.78	$10.67	$10.57
Granular Urea (50 lb N/ac)	lb	$0.56	1	$0.54	$0.53	$0.53	$0.52
Tree planting stock (species) [5, 6]	tree	$1.16	1	$3,037	$3,008	$2,980	$2,952
Monitoring (Spring)	acre	$4.98	annual	$56.00	$52.00	$49.00	$46.00
Monitoring (Summer)	acre	$4.98	annual	$56.00	$52.00	$49.00	$46.00
Land rent row crop (non-irrigated)[7]	acre	$63.60	annual	$712.00	$664.00	$622.00	$583.00
Land rent pasture [8]	acre	$21.50	annual	$245.00	$228.00	$214.00	$200.00
Stump removal after final rotation	acre	$300	15	$167.00	$144.00	$125.00	$109.00

[1]. Cost data (assumes custom rates): Manatt et al. 2013; Plastina and Johanns 2016; Ibendahl 2016; [2]. Assumes initial 4' X4' spacing or 2723 seedlings per acre; [3]. Does not include off-site transportation and handling costs. [4]. Cost data: Regional transaction survey of suppliers; [5]. Composite price for Silver Maple (Acer saccharinum) from 4 regional forest nurseries. Price is the same for other Great Plains region reference species: populous sp. (hybrid), Siberian elm (Ulmus pumila), and Black locust (Robinia pseudoacacia); [6]. Initial planting density is critical for biomass production. Studies show the effects of different densities on yield. Planting density also affects cost. A 3.3' by 3.3' spacing is 4,000 seedlings per acre which would cost $4,640. A wider spacing 6.6' by 6.6' is 1,013 seedling costing $1,175; [7]. Land rent for non-irrigated row-crop land data: Taylor 2016, ND DLT 2016; [8]. USDA National Agricultural Statistics Service - September 5, 2014.