ABSTRACT

A crop residue harvesting system for a harvesting machine is provided. The crop residue harvesting system includes a blower and a transition member having a first position and a second position. In a first position the transition member directs at least a portion of the crop residue to the blower for harvesting of the crop residue. In a second position the transition member allows for spreading at least a portion of the crop residue. A lever or actuator may be operatively connected to the transition member for selecting between the first position and the second position or selecting an intermediate position to control the proportions of the crop residue harvested and the crop residue spread.
Fig. 6
**Fig. 8**

1. Prescription map data (450)
2. Intelligent control (400)
3. Residue map data (452)

**Fig. 9**

1. Separate grain from residue (930)
2. Chop residue with residue chopper (932)
3. Spread residue (936)
4. Position or setting? (934)
5. Direct residue towards accelerator (938)
6. Collect residue (940)

- GRAIN
- RESIDUE
COMBINATION RESIDUE SPREADER AND COLLECTOR FOR SINGLE PASS HARVESTING SYSTEMS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority under 35 U.S.C. §119 to provisional application Ser. No. 60/910,250 filed Apr. 5, 2007 and Ser. No. 60/998,884 filed Oct. 15, 2007, both of which are herein incorporated by reference in their entireties.

GRANT REFERENCE

[0002] This invention was made with government support under Grant No. 68-3A75-4-137 awarded by USDA/NRCS and DOE. The Government has certain rights in this invention.

BACKGROUND OF THE INVENTION

[0003] Agricultural combine harvesters are typically designed to cut off crops at ground-level, separate non-grain plant matter from the crop portions of the plant, save the crop portions to a holding tank or reservoir, and discard the non-grain plant matter at the rear of the vehicle.

[0004] Often, the non-grain plant matter, includes, without limitation, stems, cobs, stalks, leaves, and branches. The term crop residue may be used to describe this generally non-grain plant material. This term is indicative of the historical relative value of grain and non-grain material. The crop residue is chopped at the rear of the combine harvester and distributed over the ground where it is broken down by microbes in the soil and provides fertilizer for the next growing season’s crops.

[0005] In recent years, however, there has been a growing movement to recover this non-grain plant material and to use it for secondary processes, such as for a biomass material for ethanol production. Thus, this non-grain plant material has value beyond its traditional usage. The collection of the material can either occur simultaneously with grain harvest in a single pass operation, or collected after grain harvest, in a multiple pass operation. In a single pass operation, the non-grain plant material can be collected after it is chopped at the rear of the vehicle and is directed into a “stover” cart or similar wheeled container that is towed behind the combine harvester to receive the non-grain plant matter, while the grain is collected in the combine grain tank. In a multi-pass operation, the non-grain material can be left on the field during grain harvest and collected during subsequent field operations, using a baler, forage harvester or similar machinery.

[0006] What is needed, therefore, is an apparatus for varying the amount of chopped non-grain plant material that is distributed over the ground while the vehicle is underway. What is also needed is a way of automatically varying the amount of chopped non-grain plant material that is deposited on the ground based upon soil parameters, crop parameters, terrain parameters or other environmental or regulatory factors.

[0007] It is an object of this invention to provide such an apparatus.

BRIEF SUMMARY OF THE INVENTION

[0008] According to one aspect of the present invention, a crop residue harvesting system for a harvesting machine having a crop residue chopper is provided. The crop residue harvesting system includes an accelerator to assist in conveying crop residue and a transition member, the transition member having a first position and a second position. In a first position the transition member directs at least a portion of the crop residue to the accelerator for harvesting of the crop residue. In a second position the transition member allows for spreading at least a portion of the crop residue.

[0009] According to another aspect of the present invention, a harvesting machine is provided. The harvesting machine includes a self-propelled vehicle adapted for separating grain from crop residue, a residue chopper operatively connected to the vehicle and adapted for receiving the crop residue and chopping the crop residue to form chopped crop residue, an accelerator for conveying the chopped crop residue, and a transition member having a first position and a second position operatively connected between the residue chopper and the accelerator. In a first position the transition member directs at least a portion of the chopped crop residue to the accelerator for harvesting of the chopped crop residue. In a second position the transition member allows for spreading at least a portion of the chopped crop residue.

[0010] According to another aspect of the present invention, a method for harvesting a crop using a harvesting machine is provided. The method includes selecting a setting on the harvesting machine to control relative proportions of crop residue spreading and crop residue harvesting, separating grain from crop residue using the harvesting machine, collecting the grain using the harvesting machine, and chopping the crop residue using a chopper of the harvesting machine.

[0011] According to another aspect of the present invention, a harvesting machine is adapted for selectively collecting and spreading crop residue. The harvesting machine includes a vehicle adapted for separating grain from crop residue and a transition member having at least a first position and a second position. In a first position the transition member directs at least a portion of crop residue for collection. In a second position the transition member allows for spreading at least a portion of the chopped crop residue. There is at least one actuator operatively connected to the transition member for adjusting position of the transition member.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a perspective view of one embodiment of a harvesting machine in a crop residue collecting position.

[0013] FIG. 2 is a perspective view of the harvesting machine in a position such that crop residue is spread on the ground. FIG. 3 is a side view of the harvesting machine for spreading and collecting crop residue in a single pass.

[0014] FIG. 4 illustrates the transition member for selecting between spreading and collecting in greater detail.

[0015] FIG. 5A illustrates another arrangement for the transition member.

[0016] FIG. 5B illustrates another arrangement for the transition member.

[0017] FIG. 5C illustrates yet another arrangement for the transition member.

[0018] FIG. 6 is a block diagram illustrating electronic control of the spreading and collecting of crop residue.

[0019] FIG. 7 illustrates placement of sensors on opposite ends of a chopper.

[0020] FIG. 8 is a block diagram illustrating the use and creation of map data.
FIG. 9 is a flow diagram illustrating collection and spreading of crop residue.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The device combines two separate functions and can be switched to perform either of the functions at a given time. The transition/residue spreader can be set to either funnel crop residue from the outlet of the residue chute at the back of a combine harvester to a blower for residue harvest purposes, or it can be set to deflect the residue away from the blower and uniformly distribute it on the ground. The transition component funnels the crop residue from the chute to the blower being used for stover collection purposes. Thus, the flexibility of performing either operation is provided with minimal effort required to switch between the two. Moreover, the present invention provides for controlling relative amounts of crop residue which is collected and spread and this control may be provided electronically either by an operator or based on geographic position within a field or other factors such as, but not limited to, soil parameters such as soil moisture, soil pH, soil clay content, soil sand content; terrain parameters such as inclination of the field; and plant parameters such as the moisture content of the non-grain plant material, quality of material and the volume of the non-grain plant material, and other environmental or regulatory parameters such as residue removal rates for conservation compliance.

FIG. 1 is a perspective view of one embodiment of a harvesting machine in the form of a combine harvester. The combine harvester includes a self-propelled combine vehicle, to which a harvesting head is attached. The harvesting head is supported on a feeder house that is pivotally coupled to and disposed at the front of the vehicle. A threshing system is disposed within the vehicle. The threshing system feeds the threshed crop material to a cleaning and separating system, which is also disposed within the vehicle. Grain that is separated during cleaning and separating stages of the cleaning and separating system falls to the bottom of the combine harvester and is conveyed by a grain elevator to a grain tank where it is held for future unloading such as to a grain cart (not shown) via unloading conveyor.

Non-grain plant material, such as stems, stalks, leaves, branches, and cobs, is conveyed from the cleaning and separating system to a chopper disposed at the rear of the vehicle. Chopper may include a rotating shaft on which a plurality of knife blades are attached. Such blades preferably chop the non-grain plant material into lengths of about 1-2 inches or less.

The chopper imparts considerable momentum to the chopped non-grain plant material, causing it to exit the chopper into a transition member. A transition member is a structure located anywhere between the chopper and the accelerator for selectively directing flow of crop residue between crop residue collecting and crop residue spreading. As shown in FIG. 1, the transition member includes a conduit connected to the exit of chopper. The conduit extends between the chopper and the accelerator which may be disposed approximately 2 feet away from the chopper. The accelerator includes a rotor that spins at high speed and conducts the chopped non-grain plant material up an exit conduit which is coupled to the outlet of the accelerator. The exit conduit, in turn, directs the chopped non-grain plant material into a grain cart or other storage or transport container. FIG. 2 illustrates the combine harvester of FIG. 1 except the transition member is in a different relative position to affect the flow of crop residue from the harvester. As shown in FIG. 2, the inlet end of the transition member is raised above the outlet from the chopper to direct the path of crop residue so that crop residue is spread on the ground and not directed towards the accelerator.

FIG. 3 illustrates the combine harvester with a storage cart. The grain cart may be drawn on the field by the combine to which it is attached by a cart tongue. Alternatively, the cart may be drawn to the field by a tractor or other vehicle. In this manner, the combine harvester may make a single pass of the field to collect grain in the grain tank and crop residue in the cart. In addition, because of the transition member which may include a conduit, some or all of the crop residue may be spread with the remaining portion collected through the control of the relative position of the transition member with respect to the chopper and/or the accelerator.

Referring now to FIG. 4, a detailed illustration is provided showing the chopper, transition member including a conduit, accelerator, and exit conduit in partial cutaway. In FIG. 4, the conduit is illustrated in three different positions. The conduit functions to direct the flow leaving chopper proportionally into either or both of two directions: exit conduit and thence into wagon.

A first position is illustrated in which the conduit covers the entire outlet of the chopper, directing all chopped non-grain plant material exiting the chopper into the conduit and thence into the accelerator.

A second position is also illustrated in which the conduit partially covers the outlet of the chopper conducting a portion of the chopped non-grain plant material into the conduit and directing the remaining portion of the chopped non-grain plant material against flow directors that are coupled to the bottom of the conduit and are disposed to direct chopped non-grain plant material into a wide swath that will cover the ground behind the combine harvester, extending substantially all the way from the left side of the combine harvester to the right side of the combine harvester. In an arrangement, flow directors are disposed to direct chopped non-grain plant material into a wide swath that will cover the ground behind combine harvester, extending substantially all the way from the left side of the combine harvesting head to the right side of the combine harvester.

A third position is further illustrated in which all of the non-grain chopped plant material leaving chopper is directed into flow directors. In this manner, all the chopped plant material leaving chopper is distributed across the ground. By extension, none of the chopped non-grain plant material is directed into the open end of the conduit.

While only three positions are illustrated in FIG. 4, conduit can take any position between position and position. Thus, different relative amounts of crop residue may be spread or harvested.

In an alternative arrangement, shown in FIG. 5A, the transition member includes a conduit. The inlet end of the conduit is pivotally coupled to the outlet of the chopper. The outlet end of the conduit is movable up and
down to the same range of positions shown in FIG. 4 with respect to the inlet of accelerator 126. In this embodiment, flow directors 206 are disposed adjacent to accelerator 126, and are not disposed on conduit 125.

[0033] In another alternative arrangement, shown in FIG. 5B, the accelerator 126 is movable with respect to the inlet of positions in which 100% of the chopped non-grain plant material is directed into accelerator 126 and 100% of the chopped non-grain plant material is directed into flow director 206 and all positions in between as in the previous examples. In this arrangement, the transition member 124 includes the inlet conduit to the accelerator 126.

[0034] In a further alternative arrangement shown in FIG. 5C, a portion 210 of the flow of conduit 124 is pivotable up-and-down through a similar range of positions to direct 100% of the chopped non-grain plant material into accelerator 126 or 100% of the chopped non-grain plant material into flow director 206 and all positions in between as in the previous examples. In this arrangement, the transition member 124 includes the outlet conduit from the chopper 128.

[0035] Other alternative arrangements for the transition member are contemplated. For example, the transition member may be placed after the accelerator. Thus, the transition member need not be positioned between the chopper and the accelerator as shown.

[0036] In each of the foregoing examples, an actuator 212 is provided to move the movable complement to its range of positions in order to provide for the direction of flow either through accelerator 126 or over the ground. Actuator 212 as shown here is a hydraulic cylinder having one end connected to a rigid support and a second end connected to the element that is moved to change the direction of flow of chopped non-grain plant material. Thus, in the arrangements shown, the actuator 212 is operatively connected to the transition member 124 to change paths of crop residue from the chopper 118.

[0037] Actuator 212 need not be a hydraulic cylinder, however. It may be a linear actuator that is hydraulically, pneumatically, or electrically driven. It may be a rotary actuator that is hydraulically, pneumatically, or electrically driven. Other types of actuators may be used as appropriate in a particular application or environment.

[0038] In one arrangement, the operator has control in the operator’s cab 214 (FIG. 3) that is operable while the vehicle is underway to reposition the actuator and redirect flow either through accelerator 126 or over the ground. In another arrangement, one or more sensors are provided that sense soil conditions, terrain conditions, or crop conditions and automatically reposition the actuator according to an algorithm stored in an electronic memory of an intelligent control such as a microcontroller, processor, or other type of intelligent control. In another arrangement, a map is provided to, either alone, or in combination with the above identified sensors, be used to automatically reposition the actuator 212 according to an algorithm stored in an electronic memory of a microcontroller.

[0039] FIG. 6 illustrates several of these arrangements in schematic diagram form. Referring now to FIG. 6, an intelligent control 400 is electrically connected to an actuator 212 which may control a hydraulic valve to change the relative position of the transition member. In this way, the intelligent control 400 controls the relative amounts of crop residue spread and collected. The intelligent control can be based on instructions within memory 414, such as instructions formed based on a map. The intelligent control may also be based on signals from various sensors as well as operator input devices.

[0040] Intelligent control 400 is coupled to the terrain sensor 406 which is responsive to the slope of the ground over which combine harvester 100 is traveling. As the slope changes, terrain sensor 406 sends a signal indicative of the slope of the ground to the intelligent control 400, which receives the signal and adjusts the position of actuator 212 accordingly. In particular, as terrain sensor 406 senses the changing slope, the intelligent control 400 is configured to adjust actuator 212 to increase the amount of chopped non-grain plant material that is distributed over the ground, thereby providing heavier ground cover on portions of the field with greater slope. This additional ground cover retains rain and slows run off thereby reducing soil erosion.

[0041] Intelligent control 400 is also coupled to soil sensor 408 which senses the soil surface residue. As surface residue decreases, the intelligent control 400 is configured to adjust actuator 212 to increase the amount of chopped non-grain plant material that is distributed over the ground. In this case, it is assumed that the objective is to maintain surface plant residue above a certain threshold for conservation management compliance.

[0042] The intelligent control 400 is also coupled to soil sensor 410 which senses the organic matter content of the soil. As organic matter increases, the intelligent control 400 is configured to decrease the amount of chopped non-grain plant material that is distributed over the ground. The assumption is that if soil organic matter levels are high greater material removal rates are possible without effecting soil quality. This will allow higher removal rates and increased economic returns.

[0043] The intelligent control 400 is also coupled to an electronic position sensor 412 such as a GPS receiver, LORAN receiver, or other ground, satellite-based, or dead reckoning position sensor. The intelligent control 400 is electrically connected to a memory 414 which may be internal and/or external and which stores map data of the field through which combine harvester 100 is traveling and harvesting crop. For each possible harvester position in the field this map indicates a desired position of actuator 212 necessary to deposit an appropriate amount of chopped non-grain plant material on the ground. In one configuration, this map data is derived from one or more soil conditions, such as the amount of nitrogen, phosphorus, or other trace elements in the soil, soil acidity, and amounts of previous herbicide, pesticide, or fertilizer applications. The plant material removal rates may be dictated by any one of these agronomic parameters.

[0044] The intelligent control 400 is also coupled to one or more crop sensors 416 which are disposed in combine harvester 100 in a flow path of the cut crop to determine characteristics of the cut crop material.

[0045] In one arrangement, a crop sensor 416 is a moisture sensor. The intelligent control 400 is configured to control actuator 212 to vary the amount of chopped non-grain crop material that is deposited on the ground as the crop moisture changes.

[0046] In another arrangement a crop sensor 416 is a material quality sensor, such as ethanol conversion potential. The intelligent control 400 is configured to control actuator 212 to increase the amount of chopped non-grain plant material that is deposited on the ground as the crop stover quality decreases.
In another arrangement an operator input device 420 is coupled to the intelligent control 400 to permit the operator to select the type of crop being harvested, such as wheat or corn. The intelligent control 400 is configured to control actuator 212 to vary the amount of chopped non-grain plant material that is deposited on the ground based upon the type of crop that is being harvested.

The intelligent control 400 is also coupled to a material flow rate sensor 418. Depending on the fullness of the crop growth that it harvests, the amount of non-grain plant material may vary significantly. This may require that the system adjusts to the changing flow rate of non-grain plant material by adjusting actuator 212 to maintain constant the amount of non-grain plant material distributed over the ground.

For example, in a parched portion of the field the plants being harvested may be stunted and produce very little non-grain plant material for sending through chopper 118. This will not change the volume of air that is conveyed through chopper 118 and accelerator 126, but it will reduce the density of chopped non-grain plant material entrained in the air—the material flow rate of chopped non-grain plant material through conduit 125, and thus the amount of material deposited on the ground.

To maintain constant the amount of material distributed on the ground, the intelligent control 400 is configured to monitor the mass flow rate of non-grain plant material passing through combine harvester 100 and to control actuator 212 to maintain the material flow rate at the appropriate material flow rate.

For example, the intelligent control 400 is configured to continually determine an appropriate material flow rate to be deposited on the ground based upon the changing signals received from one or all of sensors 406, 408, 412, 416, 418 and the location of the vehicle indicated by map data stored in the memory 414. As the combine harvester travels through the field, the appropriate material flow rate will change. The intelligent control 400 correspondingly changes the position of actuator 212 to maintain this appropriate material flow rate. Similarly, the intelligent control 400 senses when there is a change in the amount of the material entrained in the air and corrects for this as well to maintain the appropriate material flow rate.

The material flow sensor 418 may be disposed in the flow path of the non-grain plant material upstream of chopper 118. It may also be disposed in a flow path downstream of chopper 118. Referring now to FIG. 7, placement of several different material flow rate sensors is shown. They are identified in FIG. 7 as sensors 418A, 418B, 418C, and 418D.

Material flow rate sensors 418A is an optical flow rate sensor which is configured to transmit light between the two sensor elements across a flow path disposed upstream of the inlet of chopper 118.

An identical optical flow rate sensor may be alternatively disposed downstream of the outlet of chopper 118. It is shown in FIG. 5 as sensor 418B.

Material flow rate sensor 418C is a mass impact flow rate sensor responsive to the impact of non-grain plant material against a striker plate. The greater the material flow rate, the greater the material impacts against sensor 418C, and the greater the signal generated by sensor 418C.

An identical mass impact sensor may be disposed downstream of the outlet of the chopper. It is shown in FIG. 5 as material flow rate sensor 418D. Of course, additional sensors and types of sensors and alternative placements may be used to assist in sensing data which may be used to control the relative amounts of crop residue spread and collected. Additional sensors of any number of types may be placed throughout the combine in any number of locations or configurations to assist in sensing information or data useful in the control or monitoring of the performance of the combine, characterization of grain or grain movement, characterization of non-grain material or non-grain material movement, or for other purposes.

FIG. 8 is a block diagram illustrating information flow. As shown in FIG. 8, prescription map data 450 may be used to provide the intelligent control 400 with instructions regarding control of the spreading and collecting of crop residue. The intelligent control 400 then provides for controlling the spreading and collecting of crop residue at least partially based on the prescription map data 450. The intelligent control 400 may save data regarding its control of the spreading and collecting of crop residue to generate residue map data 452. The residue map data 452 may be the same or different from the prescription map data 452 as prescribed operations may be over-ridden by operator control, or based on feedback from various sensors.

FIG. 9 is a flow diagram illustrating movement of residue within the harvesting machine such as a combine harvester. In step 930, grain is separated from residue. The grain may be collected in a conventional manner. In step 932, the residue is chpped with a residue chopper. The residue chopper may be of any type or design, including but not limited to a flail chopper. In step 934 alternative paths for the residue are provided depending upon the current configuration or setting. The configuration may be modified in various ways such as by changing position of a lever or electronic control. If the configuration is set to spread residue then in step 936 the residue is spread. Alternatively, if the configuration is set to collect residue then in step 938 residue is directed towards an accelerator. In step 940, the residue is collected. In step 934, the position or setting may direct different amounts or proportions of crop residue towards the accelerator and to be spread. There are any number of positions which allow for varying amounts of crop residue to be spread and collected, thus varying amounts of crop residue may be spread while varying amounts of crop residue are collected during a single pass harvesting operation.

A combination residue spreader and collector for single pass harvesting systems has now been disclosed. It is to be understood that the present invention is not to be limited to the specific embodiments described here as variations in size, form, structure, and features are contemplated. These and other variations, options, and alternatives are within the spirit and scope of the invention.

What is claimed is:

1. A crop residue harvesting system for a harvesting machine having a crop residue chopper; the crop residue harvesting system comprising:
   - an accelerator to assist in conveying crop residue;
   - a transition member having a first position and a second position;
   - wherein in a first position the transition member directs at least a portion of the crop residue to the accelerator for harvesting of the crop residue;
   - wherein in a second position the transition member allows for spreading at least a portion of the crop residue.
2. The crop residue harvesting system of claim 1 wherein the transition member further having at least one intermediate position between the first position and the second position, wherein in the intermediate position the transition member directs a first portion of the crop residue to the accelerator for harvesting of the crop residue and allows a second portion of the crop residue to be spread.

3. The crop residue harvesting system of claim 1 further comprising an actuator operatively connected to the transition member adapted for selecting at least between the first position and the second position.

4. The crop residue harvesting system of claim 1 further comprising an actuator operatively connected before the transition member and adapted for selecting at least between the first position and the second position.

5. The crop residue harvesting system of claim 1 further comprising an actuator operatively connected after the transition member and adapted for selecting at least between the first position and the second position.

6. The crop residue harvesting system of claim 1 wherein in the first position the transition member is above a discharge opening associated with the chopper.

7. The crop residue harvesting system of claim 1 wherein in the second position, the transition member is aligned with a discharge opening associated with the chopper.

8. The crop residue harvesting system of claim 1 wherein position of the transition member is electronically controlled.

9. The crop residue harvesting system of claim 1 wherein the transition member comprises a conduit.

10. The crop residue harvesting system of claim 9 wherein the conduit is pivotally connected proximate the chopper.

11. The crop residue harvesting system of claim 9 wherein the conduit is pivotally connected proximate the accelerator.

12. The crop residue harvesting system of claim 1 further comprising at least one sensor positioned proximate the residue chopper and adapted for sensing at least one characteristic associated with crop residue.

13. A harvesting machine, comprising:
   a self-propelled vehicle adapted for separating grain from crop residue;
   a residue chopper operatively connected to the vehicle and adapted for receiving the crop residue and chopping the crop residue to form chopped crop residue;
   an accelerator for conveying the chopped crop residue;
   a transition member having a first position and a second position operatively connected between the residue chopper and the accelerator;
   wherein in a first position the transition member directs at least a portion of the chopped crop residue to the accelerator for harvesting of the chopped crop residue;
   wherein in a second position the transition member allows for spreading at least a portion of the chopped crop residue.

14. The crop residue harvesting system of claim 13 wherein the transition member further having at least one intermediate position between the first position and the second position, wherein in the intermediate position the transition member directs a first portion of the chopped crop residue to the blower for harvesting of the chopped crop residue and allows a second portion of the chopped crop residue to be spread.

15. The harvesting machine of claim 13 further comprising a lever operatively connected to the transition member adapted for selecting between the first position and the second position.

16. The harvesting machine of claim 13 wherein the transition member is electronically controlled.

17. The harvesting machine of claim 13 wherein the residue chopper is a flail chopper.

18. The harvesting machine of claim 13 further comprising an actuator operatively connected proximate the transition member for switching between two or more positions.

19. The harvesting machine of claim 18 further comprising an intelligent control.

20. The crop residue harvesting system of claim 1 further comprising at least one sensor electrically connected to the intelligent control and adapted for sensing at least one characteristic associated with crop residue.

21. The crop residue harvesting system of claim 1 wherein the transition member comprises a conduit.

22. A method for harvesting a crop using a harvesting machine, comprising:
   selecting a setting on the harvesting machine to control relative proportions of crop residue spreading and crop residue harvesting;
   separating grain from crop residue using the harvesting machine;
   collecting the grain using the harvesting machine; and
   chopping the crop residue using a chopper of the harvesting machine.

23. The method of claim 22 further comprising if the setting provides for harvesting the crop residue, conveying at least a portion of the crop residue from the chopper to an accelerator.

24. The method of claim 22 further comprising collecting the crop residue.

25. The method of claim 22 further comprising if the setting provides for crop residue spreading, spreading at least a portion of the crop residue.

26. The method of claim 22 wherein the step of selecting is performed by positioning a lever.

27. The method of claim 22 wherein the step of selecting is performed under electronic control.

28. The method of claim 22 wherein the setting provides for crop residue spreading substantially all of the crop residue.

29. The method of claim 22 wherein the setting provides for crop residue harvesting substantially of the crop residue.

30. The method of claim 22 further comprising sensing at least one characteristic of the crop residue.

31. The method of claim 30 wherein the selecting the setting being automatically performed at least partially based on at least one characteristic of the crop residue.

32. The method of claim 30 wherein the selecting the setting being automatically performed at least partially based on map data.

33. A crop residue harvesting system for a harvesting machine having a residue chopper, the crop residue harvesting system comprising:
   an accelerator;
   a transition member operatively connected between the residue chopper and the accelerator, wherein relative position of the transition member to the accelerator or the chopper controls relative amounts of the crop residue harvested and spread;
   at least one actuator for adjusting the relative position of the transition member; and
an intelligent control operatively connected to the at least one actuator for controlling the relative position of the transition member to thereby control the relative amounts of the crop residue harvested and spread.

34. The crop residue harvesting system of claim 33 further comprising at least one position sensor electrically connected to the intelligent control.

35. The crop residue harvesting system of claim 33 further comprising at least one flow sensor electrically connected to the intelligent control for use in monitoring flow of the crop residue.

36. The crop residue harvesting system of claim 35 wherein the at least one flow sensor is positioned to measure flow of crop residue cut and collected.

37. The crop residue harvesting system of claim 33 further comprising a geolocation sensor operatively connected to the intelligent control wherein the intelligent control is adapted for control the at least one actuator at least partially based on a geolocation associated with the crop residue harvesting system.

38. The crop residue harvesting system of claim 37 wherein the geolocation sensor comprises a GPS receiver.

39. A harvesting machine adapted for selectively collecting and spreading crop residue, comprising:

- a vehicle adapted for separating grain from crop residue;
- a transition member having at least a first position and a second position;

wherein in a first position the transition member directs at least a portion of crop residue for collection;

wherein in a second position the transition member allows for spreading at least a portion of the chopped crop residue.

at least one actuator operatively connected to the transition member for adjusting position of the transition member.

40. The harvesting machine of claim 39 wherein the transition member having a plurality of intermediate positions between the first position and the second position.