K.K. Wagh Education Society's
K.K. Wagh Institute Of Engineering Education & Research
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'Advanced Automation In Agriculture'

Mechanical Engineering Department

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INTRODUCTION

Traditional Vs Modern Agriculture

Image Courtesy: images.google.com

NEED OF AUTOMATION

Pros

- Improved Safety.
- Better Product Quality.
- Shorter workweeks for labour.
- Increased in Productivity.
- More efficient use of materials.

Cons

- Workers Displacement.
- High Capital Expenditure required to invest in automation.
- Higher maintenance level.

Possible Phases/Stages

Stages	Status of Automation (India)
Land Preparation.	Partially Exists
Seed Sowing	Partially Exists
Weeding	Decent Level of Automation
Irrigation + Pesticide + Some Fertilizers	No Automation
Harvesting	Decent Level of Automation

Center Pivot Irrigation System

- Also known as **Water Wheel or Circle Irrigation System.**
- Involves self-propelled system.
- It contains several segments of pipes mounted on wheel towers with sprinklers to fed water to crops in circular manner.
- In this, the equipment rotates around central pivot.
- **Centre Pivot are not used in US** because this system irrigates water in a circular plot and did not cover corners of the square field.

Image adopted from [1]

Lateral Move Irrigation System

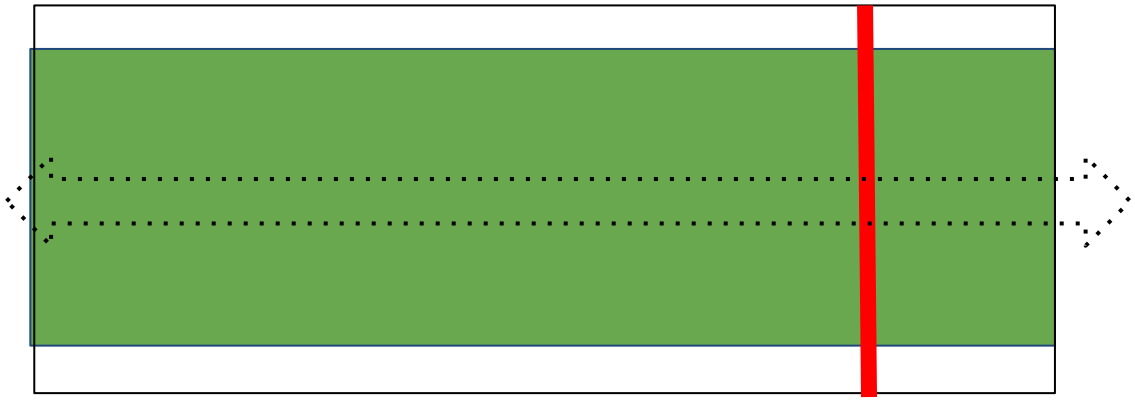
- It contains series of pipes with drip tubes having sprinklers connected to it which feds water to crop.
- It distributes equal amount of water in a straight line .

Image adopted from [2]

Image adopted from [3]

Lateral Move Irrigation

Green is farm, red is the lateral move irrigation system and black dotted arrow is the direction of movement



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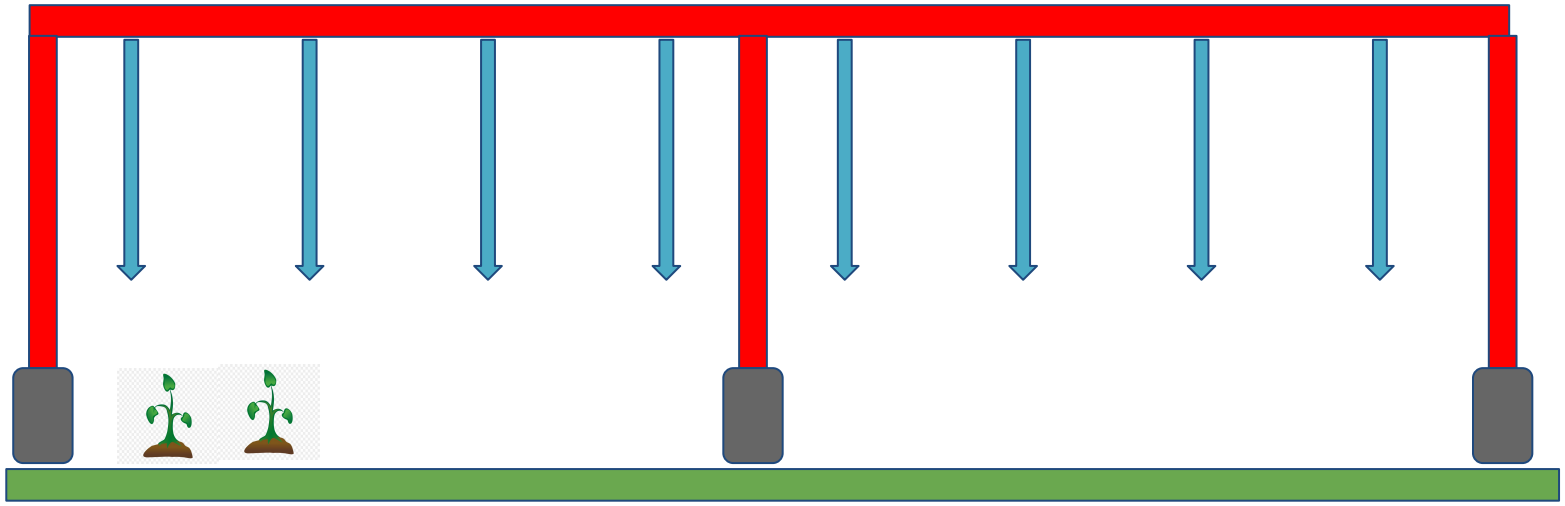

Engineering Considerations

- Dimension of Wheels.
- Length and material of the main beam.
- Supports for length of the beam across the width of field.
- Power requirement.

Engineering Considerations

Dimension of Wheels

- Choose from readily available type and sizes.
- Tyres and other replacement parts should be easily available.
- Consider the use of standard wheel dimensions for eg. that of a truck, bus or tractors.

Engineering Considerations

Length and material of the main beam

- Length of the beam should be chosen based on the width of the area to be irrigated.
- Material of the beam should be chosen based on the strength requirement for support and other irrigation equipments on the beam, for eg. the number of sprinklers.

Engineering Considerations

Supports for the main beam.

- Depending on area, multiple beams with support have to be installed.
- Support wheels also have to be installed depending on the requirement.
- The number of supports required would increase as we the width of the field increases.

Engineering Considerations

Power Requirement.

- Motor units, for example, mini-tractors could be used to drive the irrigation system across the length of the field.
- Electrical power could also be used to drive depending on the availability.
- Either a single driving unit in the center of the field or one driving unit on each side of the main beam could be used.

Practical Considerations

- Costs calculations per unit area to be irrigated.
- Possible multiple use of the same system, for eg. to spray pesticides.
- Possible to supply water from a fixed source (for eg., a well) or from a moving truck?

Future Scope

- Higher return on investment.
- Growth Opportunities.
- Growing demand for water due to water scarcity.

Conclusion

Various aspect of the Centre Pivot System are studied and looking towards this method in Indian perspective, it may be concluded that there are vast opportunities to practice it in India. Specially, when we note the advantages of this system, such as its effectiveness to irrigate large area of land, this could ultimately help Indian farmers in a great way.

References

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