

2.3 GENERATION OF PLASMA

The plasma generation process involves the development of a Rotary Spark Gap (RSG) and Surface Discharge Reactors, which are essential for creating a stable and controlled plasma environment suitable for seed treatment. Initially, a high-voltage power supply delivers 18 kV of alternating current (AC), which is then stepped up to 70 kV AC using a transformer to achieve the necessary voltage for plasma production. This high voltage AC is converted to direct current (DC) through a rectifier, ensuring a steady energy flow. Residual AC components are filtered out using a capacitor or pulse filter, resulting in a smooth and consistent DC output.

The DC energy is applied to the RSG reactor, where high-energy sparks are produced, generating the plasma field. The spark speed is controlled by autotransformers, ensuring stable energy levels critical for uniform seed treatment. This plasma field is then transmitted to the Surface Discharge Reactor, where seeds are evenly placed and exposed to plasma for a specific duration.

This setup ensures uniform plasma distribution, effectively modifying the seed coat to enhance water absorption and nutrient uptake.

The block diagram representing the experimental setup is illustrated in Figure 1, showcasing the sequential flow of processes involved in plasma generation and application for seed treatment.

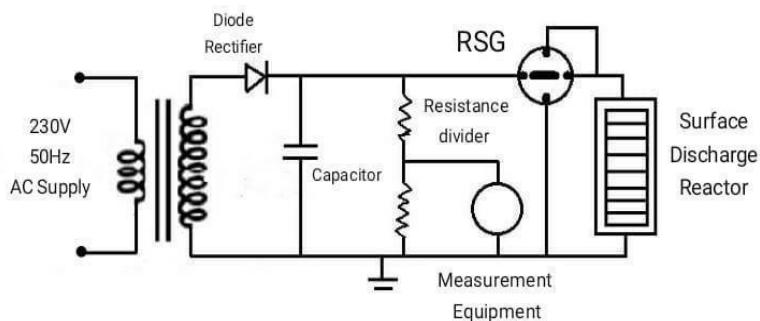


Figure 2.1 Circuit Diagram

Application of electrical discharge cold plasma treatment on agricultural seeds: A biochemical and image processing approach

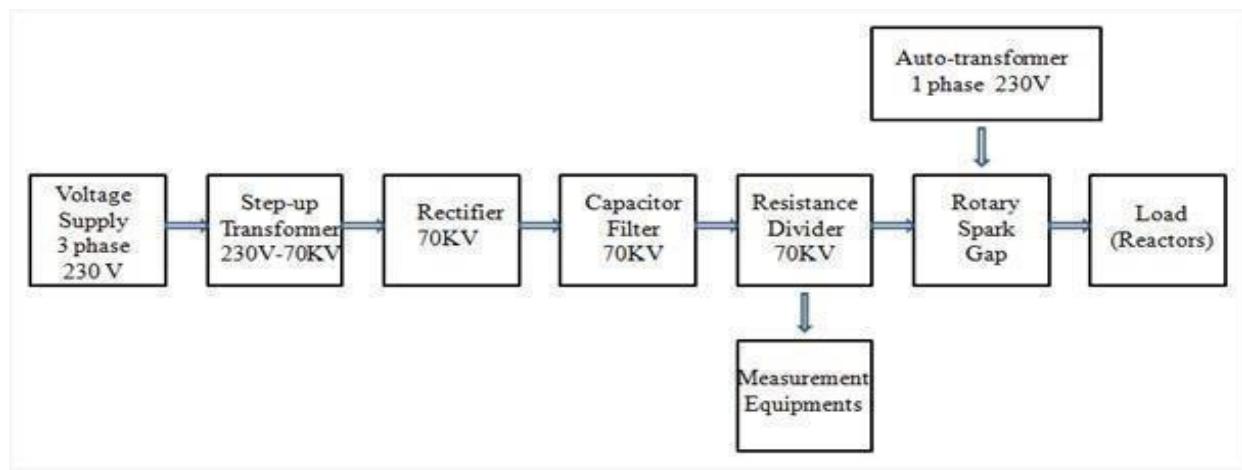


Figure 2.2: Block Diagram

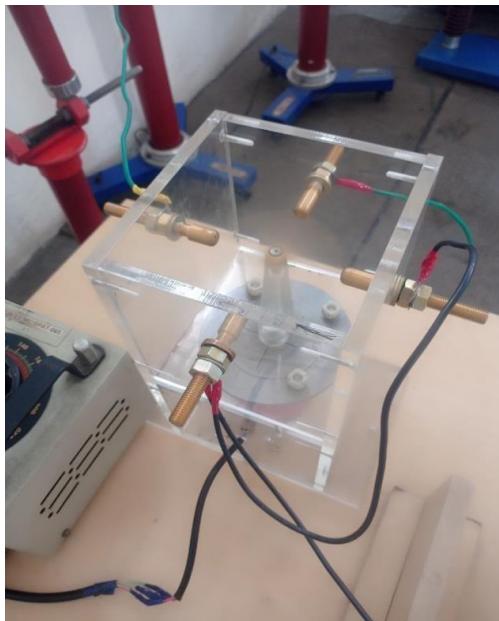


Figure 2.3: Rotary spark gap

2.4 SEED TREATMENT

lady's finger seeds were treated using the Volume Discharge Reactor, as illustrated in Figure 2.5. The seeds were carefully arranged within the reactor to guarantee uniform exposure to the plasma field. The treatment was conducted for a specific duration for 4 minutes, allowing for comparative analysis of the effects. A control group, consisting of untreated seeds, was included in the study to serve as a baseline. These seeds were not exposed to plasma and provided a reference for evaluating the impact of plasma treatment on key germination and growth parameters.

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This setup enabled a comprehensive comparison between treated and untreated seeds to assess the benefits of plasma exposure.

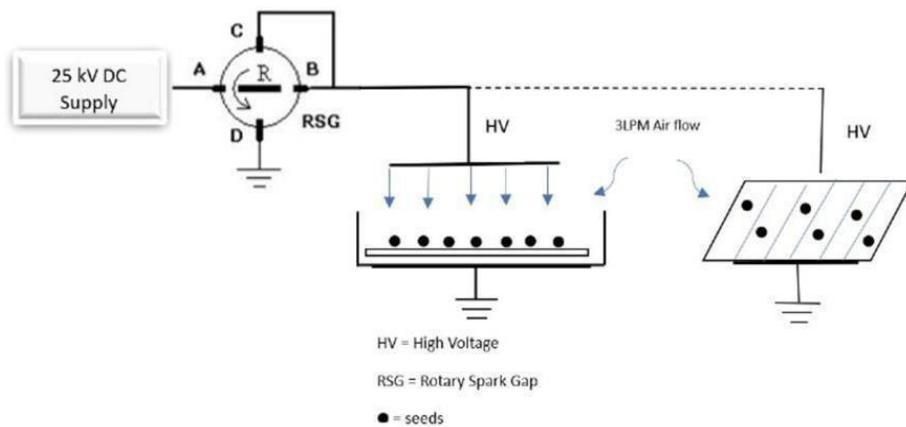


Figure: 2.4 Representation of seed treatment



Figure 2.5: Volume Discharge Reactor



Figure 2.6: Mesh of Volume Discharge Reactor



Figure 2.7: Seeds placed on Volume discharge reactor