The paper studies top-k query problem for WSN under two different models: single object model and multiple object models. The key difference between the two model is that in the single object model, each sensor's reading is treated independently while in multiple object model, all sensor's reading at one time slot are first aggregated using certain type of aggregation function.

The proposed methods are based on connected dominating set. The primary focus of the method is on time and message complexity. Mathematical proofs were given to show the effectiveness of the proposed methods. In addition, experimental and simulation were performed to verify the results.

The technical part of the paper seems sound. Both simulation and experimental results were presented. My primary concern for this paper is about its motivation:

1. The models in the paper consider top-k query for either one sensor or all sensors reading. However, in practice it is quite common to find top-k for only some of the sensors in the network.

2. The proposed methods intensively study message delay which is O(D+m\delta) of the timeslot. However, for the agricultural application scenarios discussed in Introduction, such kind of delay seems insignificant (in comparison with the timeslots in the MAC layer).

3. Some of the assumptions made in the system model are not well justified. For example, what kind of network is suitable to be modeled as growth-bounded? In addition, for most of the sensor nodes in the current research, it is not uncommon to have more than one sensor reading stored in a packet since most of the sensor readings (e.g. the light sensor that was discussed in Introduction) have fixed data length.

In summary, the paper is technically sound but it can use a better motivation so it may be accepted if room.